

COMPUTERWORLD

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**Applications
prototyping**
Interview
with Bernard H.
Boar/45



In Depth
How fast can
relational run?
Follows 60

Jury finds Burroughs defrauded B800 user

Company will appeal costly B800 verdict

By Tom Henkel
CW Staff

SAN FRANCISCO — A jury here has determined that Burroughs Corp. committed fraud and breach of contract when it leased a malfunctioning B800 minicomputer to a local insurance company in 1978.

Beaver Insurance Co. was awarded \$785,300 in actual damages on the fraud charge and \$14,000 on the breach of contract charge. The combined award of \$799,300 is said to be the largest judgment to date in an ongoing string of lawsuits filed by unhappy users of Burroughs' B80, B700 and B800 systems.

James W. Olson, associate general counsel for Burroughs, said the firm hopes to have the verdict overturned in the Beaver Insurance case, claiming "the jury returned two confused and contradictory verdicts on two successive days."

Olson explained that on Feb. 21 the jury determined that Burroughs had committed fraud and awarded Beaver Insurance \$872,555 in punitive damages. It did not award actual damages, however. Burroughs maintained that this was illegal, and the jury was instructed to reconsider its verdict. The jury returned Feb. 22 and awarded Beaver Insurance \$785,300 in actual damages.

See **FRAUD** page 4

Planned merger challenges oil firms' DP staffs

Chevron, Gulf form task forces with eye toward easing MIS integration

By Jeffry Beeler
CW West Coast Bureau

SAN RAMON, Calif. — Although the proposed merger of Chevron Corp. and Gulf Oil Corp. has yet to win formal approval from the Federal Trade Commission, both companies are already busily laying the groundwork for joining their sprawling MIS organizations.

The two petroleum industry giants have formed approximately 30 in-house task forces to study the merger's long-term implications and to formulate plans for integrating Chevron's and Gulf's main operating disciplines, including MIS.

Most of the task forces, which consist of two or three representatives from each company, have already completed preliminary sketches of their final merger plans and are now beginning to fill in the broad outlines. For the next several months, the process of fleshing out the bare bones will continue, according to Chuck Oldenburg, general manager of Chevron's Computer Services Department. In the end, the study groups expect their collective efforts to result in a set of comprehensive blueprints that will guide the two corporations through key facets of their overall merger, the largest in U.S. corporate history.

Implementation of the plans, however, will require the consent of the FTC, which is expected to approve the proposed merger either this month or in April, according to Oldenburg.

As it applies to the two firms' MIS organi-

See **MERGER** page 14

AT&T 'orphans' coming of age

By James Connolly
CW Staff

First in a three-part series

The dust is settling out there behind the new AT&T homestead, back where old Ma Bell left her seven orphans to build their own lives.

Now, out of the cloud of dust that has swirled for 14 months, seven new homes have emerged, and they are more luxurious and expansive than most people thought the orphans were capable of constructing.

The seven regional holding companies divested from AT&T are clinging to some of the familial ways while building their own independent structures. Their first year of independence was one of turmoil — for them and for their customers —

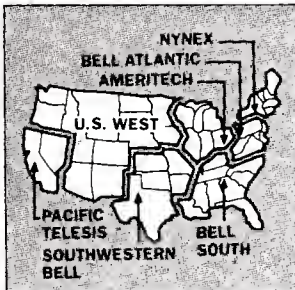
but also one of success.

Although these companies may seem like shoeless waifs compared to the predivestiture Bell family and although they face troubles en route to long-term success, the holding companies had revenues in excess of \$7 billion and profits exceeding \$800 million in 1984. As a group, the seven had revenue exceeding

IBM's \$46 billion sales by about \$12 billion.

Whether the seven offspring succeed may depend on one's viewpoint. To make

See **OFFSPRING** page 8



TOP OF THE NEWS

AT&T proposed a 56K bit/sec service it claims will provide low-cost, high-speed data transmission to business users. **Page 2.**

Hewlett-Packard Co. added 282 packages to its microcomputer line, including software that strengthens integration between HP and IBM micros. **Page 4.**

Topview is riddled with problems. That is what early users and analysts of the IBM microcomputer operating environment said. **Page 5.**

Chip manufacturers continue to suffer profit and order declines and are reacting with mass firings. **Page 10.**

NCR Comten, Inc. unwrapped a low-end processor that can be used in both IBM Systems Network Architecture and non-SNA environments. **Page 77.**

PRODUCT SPOTLIGHT

Releases boost IBM Dasd line

Compatible disk makers' prospects appear grim

By Tom Henkel
CW Staff

In the past year, IBM made the most dramatic and sweeping changes to its top-end mainframe lineup in five years. Along with announcing a well-documented list of mainframes, IBM has virtually replaced its large-scale Dasd product line with units using newer technology. The combination of important IBM announcements promises to have a significant impact on mainframe users and may spell trouble for makers of IBM-

compatible products.

The list of IBM mainframes announced in the past year is impressive. They range from the recently announced high-end 3090 models to enhanced models of the entire 3080 line and to additional models in the 4300 series of mid-range systems.

If the mainframe announcements were not enough to keep DP executives up late at night peering over new product literature, IBM has also spent the past year making significant, and in some cases long-awaited, changes to its Dasd family. These changes range from the recently announced double-capacity 3380 disk drives and cache memory enhancements

See **DASD** page 24

NEWS

AT&T proposes high-speed service

Would yield 'economical' 56K bit/sec transmission

WASHINGTON, D.C. — AT&T last week filed tariffs at the Federal Communications Commission proposing a high-speed switched 56K bit/sec digital service as part of its Accunet family of services.

Accunet Switched 56 Service, AT&T said, will offer business customers an economical alternative to dedicated private lines for sending voice, data and video signals at high speeds.

The proposed service, which will become available April 12 if the FCC approves it, differs from the existing family of Accunet services. Customers would be using a digital network with shared switched facilities rather than using a dedicated private-line service such as Dataphone Digital Service. Thus users would pay only for actual transmission times as opposed to fixed private-line tariffs incurred in point-to-multipoint configurations, AT&T said.

AT&T Communications said it saw the predomi-

nant use for Accunet Switched 56 Service in the transmission of large blocks of data, the expansion of existing private-line networks without additional add-on costs of private lines and the transmission of graphics, high-speed facsimile and full-color video teleconferencing.

The rates AT&T proposed for Accunet Switched 56 Service range from a minimum of 33 cents for the first 30 seconds, plus 6 cents for each additional six seconds, to a maximum of 45 cents for the first 30 seconds, plus 8 cents for each additional six seconds. AT&T said that the proposed service would require the customer to have either a 56K bit/sec or a 1.54M bit/sec local access channel to connect from the local exchange to the AT&T switch, the rates for which vary from state to state.

AT&T said that an initial 34 cities would have the service available in 1985 and that another 36 cities would be serviced in 1986.

FCC delays switched access charges

By Bryan Wilkins
CW Washington Bureau

WASHINGTON, D.C. — The Federal Communications Commission said it will delay the scheduled implementation of annual switched access charges of local telephone companies from June 1 until Oct. 1. The FCC also said it will order reductions in Message Toll Service (MTS) and Wats rates to take effect June 1 to reflect the collection of \$1 end-user charges.

The delaying action, which will affect carriers more than communications users, came after Bell Atlantic and Nynex Corp. petitioned for a delay of implementation of switched access charges. Switched access, as opposed to special access, involves switching publicly tariffed services through the facilities of the local telephone companies. On March 1, the FCC was slated to take up the issue of special access cost rates [CW, Feb. 25].

The primary reason for delaying the June 1 date for switched access charges, the FCC said, was to avoid "confusing revisions to pending proposals" affecting switched access, proposals now awaiting FCC action.

Bell Atlantic, citing the proposed AT&T private-

line tariff restructuring [CW, Jan. 28], said the tariffs raised problems "by inviting connection to the AT&T private-line network through nonexchange carrier facilities . . . [and] would exacerbate bypass of both switched and special access facilities."

Projected to raise \$2 billion annually

The collection of the \$1 monthly access charge to residential customers, slated to start June 1, is projected to raise up to \$2 billion annually, which will be transferred through dollar-for-dollar rate reductions in MTS and Wats. The FCC suggested that this could mean reductions averaging 6.5%.

A \$6 monthly access charge on multiline businesses has been in effect since last June.

Meanwhile, an informed source within the FCC said the scheduled March 4 implementation of planned revisions to AT&T Communications private-line rates will be postponed.

The planned revisions to AT&T's private-line rates would mean an average 8.6% hike in costs for private-line users, raising fees for voice-grade use but dropping them substantially for T1 facilities and data communications services such as Dataphone Digital Service.

Court finds remote DP usage taxable

Firm's interstate processing denied tax exempt status

By Mitch Betts
CW Washington Bureau

WASHINGTON, D.C. — The U.S. Supreme Court has sustained a state court decision that an Ohio insurance company must pay state tax on its use of remote data processing services, even though the computer services are conducted in another state.

The justices rejected an appeal by Union Central Life Insurance Co. of Cincinnati, which contended that its contract with Electronic Data Services Corp. (EDS) of Dallas is a transaction in interstate commerce and thus not subject to state taxation.

Ohio tax authorities decided to impose the state's use tax on the monthly fee that Union Central paid EDS for programming services, computer time and use of equipment. The Ohio Supreme Court upheld the tax assessment over Union Central's objections.

Ohio imposes the use tax on the "storage, use or other consumption of tangible personal property [in the state]," and state courts have ruled that it applies to data processing services.

In asking the Supreme Court to review the case, Union Central urged the court to provide guidance to states on the taxation of interstate data processing services, including access to on-line data bases. The firm noted that a new Ohio law explicitly taxes data processing equipment and that 44 other states and the District of Columbia impose sales and use taxes. The Ohio officials, however, said the matter was properly handled by the state and was not subject to federal jurisdiction.

Since 1969, Union Central has had a facilities management contract with EDS. VDTs, hard-copy terminals and high-speed printers were placed in Union Central's offices in Forest Park, Ohio, and were linked by telecommunications lines to EDS computers in Dallas, court documents said.

In 1983, Ohio tax authorities ruled that because the ultimate object of the transaction was to obtain processed data — in the form of VDT screens or hard-copy printouts — for use in Ohio, the transaction was subject to the state's use tax.

The fact that data was processed in Texas and retrieved over interstate telephone lines does not preclude state taxation, Ohio's filing said, because "this was a data processing transaction and the use tax was on the appellant's receipt and use of the printouts in Ohio."

NEWS SUMMARY

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Despite a lot of preshipment hype, IBM's Topview operating environment looks like a dud, according to early users and industry analysts/5

IBM has announced increases in the rental, lease and monthly maintenance fees on virtually all of its hardware and program products/6

Although the divested Bell operating companies are trying to upgrade their networks and improve their responsiveness, service remains a headache/8

The semiconductor industry slump has resulted in more layoffs and reduced workweeks/10

The Institute for the Certification of Computer Professionals is still struggling with the effects of a printer error that switched the covers on two of its certification booklets/12

The National Science Foundation has announced that four supercomputer centers will share \$200 million in government grants/13

If the proposed merger of Chevron Corp. and Gulf Oil Corp. becomes a reality, Gulf's computing operations and credit card processing activities will eventually be disbanded/14

CW at Info/Central: Micro-mainframe links, local-area networks and communications software were hot topics here . . . Prototyping can be an invaluable aid in the development of high-quality applications, but it should not be an excuse to abandon traditional techniques and methodologies . . . The proliferation of micro-mainframe links means increased demands for MIS managers . . . Careful planning and management involvement was crucial to automation at Metropolitan Life Insurance Co./17-22,30

Product Spotlight: Direct-access storage devices/24-27

Salaries for programmers and data base administrators will be among the fastest growing wages for DP personnel in 1985, a recent study revealed/33

A magazine subscription marketer is using computer-based instruction software to create on-line tutorials for its customers/34

Managers at RCA Corp. are using SCA Products and Services, Inc.'s Gateway to gain access to the corporate data base/35

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Apologies for the delay

A recent change in the newspaper and magazine distribution system has created a slowdown in the delivery of *Computerworld*. CW is working with postal and distribution authorities to normalize delivery.

CW apologizes for any inconvenience and appreciates its readers' patience.

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NEWS

HP doubles micro software lineup, adds 282 products

NEW YORK — Hewlett-Packard Co. doubled the number of software programs available for its personal computer line in the U.S., announcing an additional 282 products here last week.

The announcement featured the HP-developed Graphics Gallery and Executive software lines, designed to work together on the HP Touchscreen Personal Computer to produce merged text and graphics, HP said.

HP also introduced IBM Personal Computer versions of four popular software packages that, according to HP, give users the ability to share data files and reports between HP and IBM microcomputers over HP's electronic mail network.

Graphics programs available in March

The Graphics Gallery programs, all available this month, are reportedly optimized for text and graphics

output on HP plotters and printers. Users may employ either the touchscreen or the new HP Mouse, which will cost \$210 and will ship this month. The three applications can be bought separately; they are also available bundled for \$585.

Charting Gallery, priced at \$265, reportedly takes data from programs such as Lotus Development Corp.'s 1-2-3 and produces pie, bar and line charts. Solid-fill characters can be generated, the company said.

Drawing Gallery, which costs \$345, is said to allow users to create a wide range of presentation visuals and to edit and embellish visuals for reports. The package also includes a library of shapes and pictures.

Gallery Picture Library, Volume II, is priced at \$95 and makes available an additional 200 ready-made drawings.

Two members of HP's new Execu-

tive family also will be offered this month. Executive Memomaker, an enhanced version of Memomaker, will cost \$245. The program can take output from the Graphics Gallery packages and insert them into letters, memos and reports. Executive Memomaker features single-screen editing, enabling users to see the merged text and graphics page as it will appear on the output, and includes a 53,000-word spelling checker, according to HP.

Execudesk, priced at \$95, is said to act as an environment that provides quick switching and data sharing between HP-developed Touchscreen applications.

Personal Computer programs out

The four new HP applications for the IBM Personal Computer are said to permit the IBM micro to act as a workstation in HP's Personal Produc-

tivity Center.

The packages include the Personal Card File, which emulates a Rolodex card file, priced at \$160; Memomaker, priced at \$160; Advancelink, a file-transfer package, priced at \$295; and Textcharts, a program designed to create large presentation-quality text output, priced at \$200. All will be available this month except for Textcharts, which is scheduled for April delivery.

HP also introduced a Human-Interface Loop (HP-HIL) card for the Touchscreen Personal Computer. Priced at \$155 and available this month, the HP-HIL board connects a variety of input devices (including keyboards, a mouse and graphics tablets) to the Touchscreen computer.

More information on the new products is available from HP, Inquiries Manager, 1020 N.E. Circle Blvd., Corvallis, Ore. 97330.

FRAUD from page 1

actual damages, this time without punitive damages. Claiming the jury may have been confused, Olson said, "Burroughs will file a motion asking the court to enter a judgment in favor of Burroughs notwithstanding the verdict. Or, [Burroughs will] request a new trial because of the jury's inconsistent verdicts."

Beaver Insurance charged that Burroughs overstated the capabili-

ties of its B800 system and failed to explain that there were unresolved technical problems with the system when the insurance company signed a three-year lease with Burroughs in March 1978. The suit also charged that Burroughs deliberately misled Beaver Insurance into believing the B800 had interactive, multiprogramming capabilities. The firm charged that those multiprogramming capabilities were greatly limited by a file lockout feature that pro-

hibited more than one user from opening a B800 file simultaneously.

Beaver Insurance filed suit in May 1981 in the U.S. District Court for Northern California, charging fraud and breach of oral and written contracts for both the B800 system and Burroughs' maintenance of the system. The company also charged that Burroughs was negligent in providing adequate preventive maintenance on the B800 system and failed to deliver a vital software package.

The jury ruled in favor of Beaver Insurance on the fraud and breach of contract charges but ruled for Burroughs on the breach of warranty and negligence complaints.

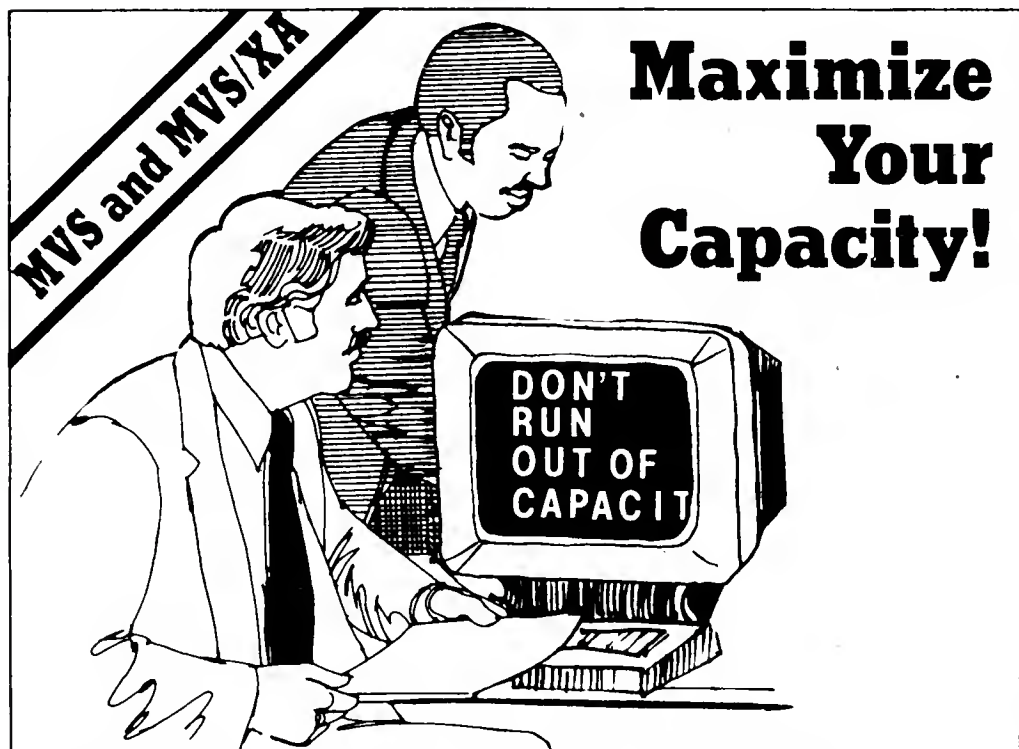
According to attorney Richard Perez, of Perez, McNab & Cook, the Orinda, Calif.-based law firm representing Beaver Insurance, the case focused on two basic issues: The B800's reliability and deficiencies in the system's multiprogramming capabilities. The suit charged that Burroughs told Beaver Insurance the B800 could perform multiprogramming functions similar to those found in larger computer systems. Namely, Perez said, Beaver Insurance believed that multiple users would be able to open a file, as long as they were accessing different records stored within that file. The file lockout feature, Perez maintained, prohibited more than one user from

opening a file at one time.

Beaver Insurance also charged that the B800 system was unreliable and was subject to frequent, unexplained system crashes, which caused Beaver Insurance to lose data and perform frequent cold starts or system generation.

The insurance company charged that the B800 system was inoperative roughly 40% of the time during its first two months of use. The company also said it continued to have problems with the system until 1980. The B800 system was removed from Beaver Insurance's offices in June 1981. Perez said Beaver Insurance is now using a Hewlett-Packard Co. HP 3000 CPU, Perez said.

The insurance company claimed the frequent system failures were a result of internal memory problems on the B800, which Burroughs corporate management knew existed before it signed the three-year lease. The insurance company also charged that by not informing its maintenance personnel of the memory problems, Burroughs took longer than necessary to identify and repair system problems. This, Perez said, was the result of allegedly defective diagnostic tools used by Burroughs maintenance personnel. Perez said it often took two or three visits by Burroughs maintenance people to identify and repair a problem.



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NEWS

IBM's Topview plays to poor reviews of early users

Limited RAM, software undercut usefulness

By Paul Korzeniowski
CW Staff

Analysts and early users report that IBM's Topview is riddled with problems.

Although Topview may eventually become IBM's most significant microcomputer software package, the product seems to be following the path of the PCjr, which was deemed a flop in its first year but appeared to rebound upon entering its second year.

"I was not very impressed with Topview," noted John Oski, an analyst at Bank of New England NA. "It is limited, and I just do not see a real need for the capabilities it provides."

Topview provides a number of windows into which a user can load applications programs, switch from one application to another by pressing a key or clicking a mouse and move data between applications.

Even though the product theoretically allows users to switch between a number of programs, the actual number with which they can work is rather limited, according to Oski, who evaluated a beta test copy of the program.

RAM need creates limitations

Limitations arise from Topview's random-access memory (RAM) needs, he said. To run Topview, 167K bytes of RAM are required, and for each application that is loaded, more RAM is needed — the exact amount depending on the function a program is performing. The maximum amount of RAM that Topview can address is 640K bytes.

"If you load Topview with [Lotus Development Corp.'s] 1-2-3 and a large spreadsheet, the 640K bytes are gone, and you can't load a second or third program," Oski claimed. "Then, what's the point of using the product?"

In addition to the RAM problem, Oski noted that right now there are few packages tailored to run under Topview. "If you run 1-2-3 or [Multimate International Corp.'s] Multimate, it takes up the whole screen and does not allow you to call up various windows," he said. The 1-2-3 and Multimate packages would have to be rewritten to solve this problem.

Program parameter change required

IBM provided a list of approximately 70 programs that could run under Topview. The list includes Ashton-Tate's Dbase II, Dbase III and Framework and Microrim, Inc.'s Rbase 4000. For these programs to run, a user must change a program's parameters, a task that novices may be unable to complete, Oski said.

Richard Strauss, vice-president of products at Corporate Software, Inc., a Waltham, Mass., value-added software distributor, claimed that no windowing package can efficiently run on an IBM Personal Computer.

"Windows were originally designed for use on a [Xerox Corp.] Star," he said. "That machine had a larger screen than the [IBM] Personal Computer. If one works with windows on an IBM Personal Computer, one can effectively use only two win-

dows. As one adds windows, applications shrink, and windows become too small to see. Also, when one calls up a window, often it covers the information you were going to compare it with."

Another Topview weak point that Oski listed was the inability to use some IBM PC-DOS operating system commands. "For one printer function, Topview required 13 steps compared with a single PC-DOS command," the analyst said.

Unlike Apple Computer, Inc.'s Macintosh, Topview was not designed to support elaborate graphics capabilities. Topview is character oriented rather than graphics oriented, which means that users enter

commands rather than point at icons. Also, Topview does not easily work with stand-alone graphics programs that run in a manner similar to 1-2-3 and Multimate.

Lack of graphics support not deterrent

Yet analysts did not judge the lack of graphics support to be a serious deterrent. "Most users work with letters rather than pictures," Strauss said. "People who work in art departments may need graphically oriented interfaces. But most users only require the graphics capability provided in a product like 1-2-3."

Robert Lefkowitz, director of microcomputer software research at Infocorp, a Cupertino, Calif., market

research firm, added, "When a first-time user looks at Macintosh's menu, he has to consult a manual to determine what the icons mean."

One positive Topview feature is its ability to move data between different applications. "Topview moves data between applications much better than the conversion routines available in most programs," Oski noted.

Despite Topview's flaws, analysts and early users agreed that the product could play an important role in the future. "IBM is committed to making Topview work. IBM will take whatever steps are necessary to make the product work, just like it did with the PCjr," Lefkowitz said.



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NEWS

Fee increases of 5% to 7% affect most IBM merchandise

RYE BROOK, N.Y. — IBM has increased the rental, lease and monthly maintenance fees on virtually all its hardware and program products by 5% to 7%, effective June 1.

The across-the-board increases affect almost all IBM products, except IBM's Personal Computer line and other products that have experienced price changes in the past six months, an IBM spokeswoman said. IBM also increased its systems engineering service fees by 8% and boosted its per-call maintenance fees by 10%. Those price changes became effective in late February.

Equipment, lease and rental fees and most program product licensing charges were increased by 7%. Monthly contract maintenance charges on some products were increased by 5%, 7% or 10%, depending on the product, the spokeswoman said.

As examples of the increases, the spokeswoman said the monthly rental fee on a 3083 Model B pro-

cessor with 32M bytes of main memory was increased from \$102,380 to \$109,538. The monthly lease fee was increased from \$81,900 to \$87,630 for a four-year lease plan. Likewise, the monthly rental fee for a 3084 Model QX processor with 64M bytes of main memory was increased from \$402,630 to \$462,625, and the monthly lease rate was hiked from \$345,900 to \$370,100 for a four-year lease agreement.

Monthly maintenance charges were unchanged on the two products. The monthly rental charge on IBM's 3480 tape drive (Model A) was increased from \$3,630 to \$3,880, and on the unit was increased from \$360 to \$385.

The spokeswoman said the 7% software price increases will not affect products distributed by IBM but manufactured by another vendor and sold under the vendor's label. In addition, IBM program products that have been subject to recent price in-

creases will not be affected by the 7% program product price hike. The increase in licensing fees applies to IBM's initial, monthly and basic license fee arrangements and the Distributed Systems Licensing Option (DSLO).

To illustrate the pricing change, the spokeswoman said the initial license fee for IBM's MVS/SP-JES3 Version 3 Release 2 will increase from \$13,500 to \$14,430. DSLO pricing for the same product will increase from \$10,125 to \$10,821.

"Program products are becoming increasingly important to our customers," the spokeswoman said. "IBM is being asked to provide additional [software] features and support. We have increased our resources to do that, and the price increases reflect that."

More information on the price increases is available from IBM Information Systems Group, 900 King St., Rye Brook, N.Y. 10573.

DEC to unveil office wares

MERRIMACK, N.H. — Digital Equipment Corp. today will announce a number of office systems products, including enhancements to the Rainbow personal computer series, the company said.

DEC acknowledged last month that it was shutting down production of the Rainbow at its Westfield, Mass., assembly plant, but the company maintains it is not abandoning the microcomputer line.

During today's announcement,

DEC President Kenneth Olsen and other senior executives are scheduled to describe DEC's views on how micros fit within an overall office workstation strategy. Upgrades to the Decmate line of word processing micros will be unveiled, DEC said.

The new offerings will provide "important price/performance improvements in environments where users interface with larger systems through personal computers," according to the company.

Datapoint posts loss, files suit to halt takeover

SAN ANTONIO — Datapoint Corp. has posted a \$15.9 million, or 79 cent/share, loss for its second quarter, down from the \$1.45 million profit it posted the previous quarter.

Revenue for the quarter declined 8% to \$130 million, compared with revenue of \$140 million the same quarter a year ago. Datapoint Chairman Harold O'Kelley last week attributed the profit decline to drops in domestic orders primarily owing to "recent speculation and uncertainty of the future ownership" of the company.

In a related matter, Datapoint last week filed suit in both U.S. District Court and state court in San Antonio, seeking to enjoin investor Asher Edelman of New York from further pursuing a bid for control of the company through the removal of its board of directors. The suit alleges that Edelman and others involved in a group of partnerships that he controls would violate federal antitrust statutes if they proceeded with the takeover attempt.

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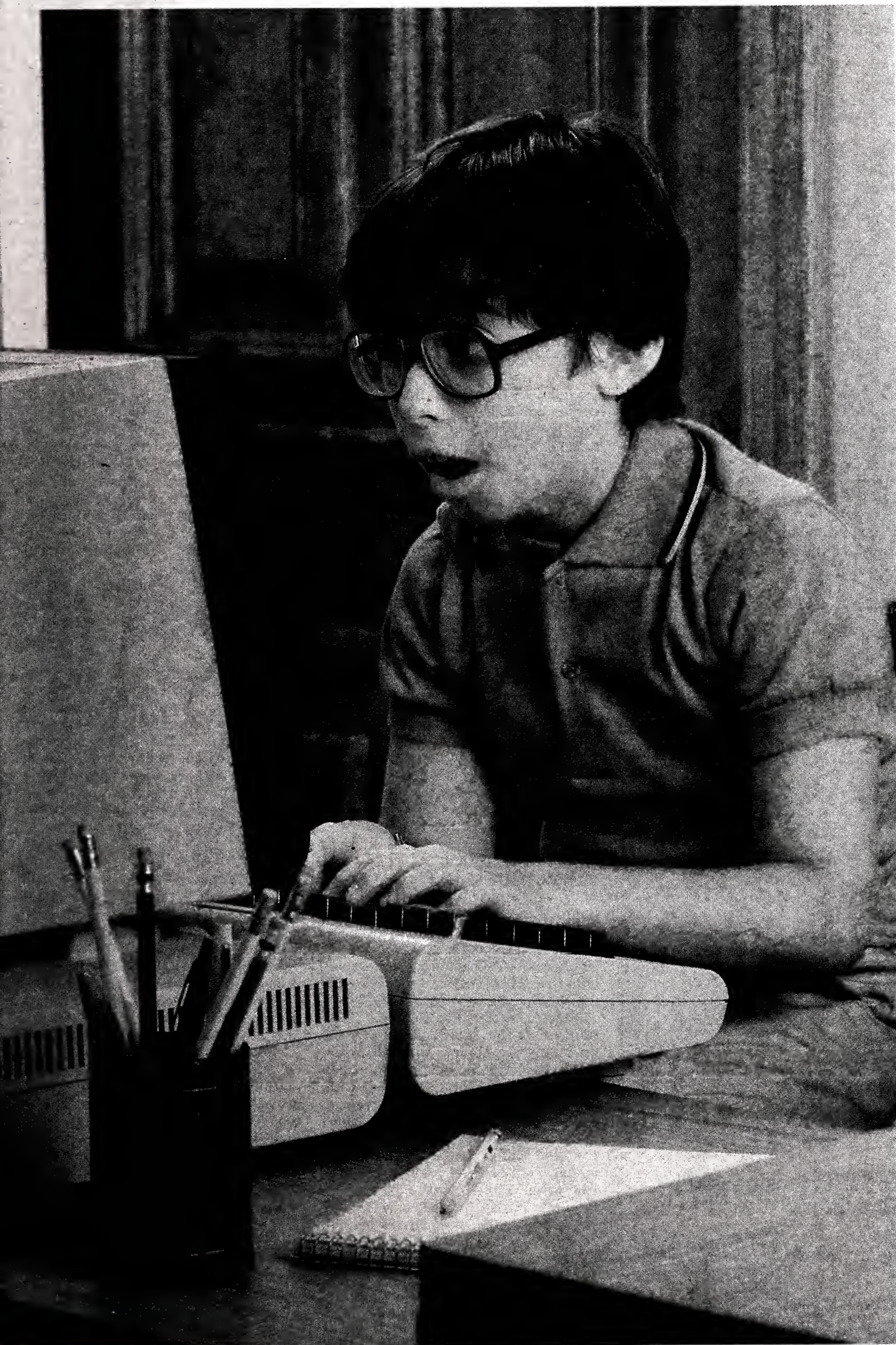
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NEWS

Telecom managers: Divestiture hassles unresolved

By James Connolly
CW Staff

Telecommunications managers interviewed recently concurred that some divestiture-related problems have abated, but this does not translate into satisfaction.

"Certainly, anything would have been easier than [Jan. 1, 1984]. Our local company, New England Telephone Co., was totally unprepared for divestiture in terms of dealing with the large corporate user," reported Len Dorrian, manager of telecommunications for Raytheon Co. in Lexington, Mass.

Dorrian, whose 77,000-employee firm is New England Telephone's largest customer, cited some of the problems experienced and progress made since divestiture. His observations echoed the complaints and occasional commendations of telecommunications managers served by the 22 divested Bell operating companies. For example, New England Telephone took five months to set up a central service bureau and to designate a Raytheon account representative to coordinate the company's service, Dorrian said.

"There are still an awful lot of service prob-

lems. We've found that most of our network problems have been New England Telephone's fault. In terms of new services, the companies still haven't straightened out in their own minds their network offerings. You'll get two sales reps trying to sell you the same circuit. [Nynex Corp.] wants you to [buy from] them, and New England Telephone wants you to [buy from] them. I don't blame the sales reps; they want the commissions, but they [represent] the same company. We end up going through New England Telephone, because even if we go to Nynex, it's New England that installs the circuit," Dorrian said.

'I don't see any improvement'

In Bell Atlantic Corp.'s territory, "with regard to service, it's getting worse," said David Culen, manager of network services for Blue Cross/Blue Shield's Washington, D.C., headquarters. "I don't see any improvement. You read a lot about reduced backlogs for private lines, but I haven't seen it." He said that with luck, a digital circuit takes six months to install and an analog circuit takes 12 to 14 weeks.

"They [the operating companies] appear to be

trying, but there were times early on when I don't think they were, although that's not true of the service people who work here in the building. They have been just super," Culen added.

According to Culen, the service problems appear to be a lack of coordination among the operating companies and AT&T. He advised managers to be persistent in making contact at the right level, not at the clerical level where workers might be content to let a problem sit unresolved, and he stressed the importance of being specific about the problem.

However, Robert Bennis, telecommunications director for Westinghouse Electric Corp., defended the regionals and the divested Bell operating companies. "On the balance I think the [holding companies and Bell operating companies] have come on really aggressively. My most direct experience has been with Bell Atlantic and [Bell Telephone Co.] of Pennsylvania, and I am fairly [pleased with] the way they have responded to this divestiture. They are doing a good job and are receptive to new ideas. There were bound to be glitches, but it's better today than it was six months ago, even if there are still soft spots," Bennis said.

OFFSPRING from page 1

such a judgment, user, investor, regulator or competitor must consider the following:

- Complaints continue about poor service and confusion about who can provide a given service, product or answer — the 22 local operating companies, AT&T or a new regional subsidiary.

- Most of the companies have at-

tacked new markets, reselling communications and office equipment and branching into fields like real estate, consulting and publishing.

- The companies are continuing efforts to digitize their systems in anticipation of futuristic integrated services digital networks (ISDN).

- The seven are subject to the whims of federal and state regulators and the divestiture court, all of whom may hold against them the

companies' first year financial successes when deciding whether to allow new ventures and new rates.

- A monster called bypass still lurks in the shadows.

W. Page Montgomery, vice-president of Economics and Technology, Inc. consulting firm, said the regional holding companies must do two things to succeed.

"With respect to plain old telephone service, they need to find new ways to avoid the loss leader they have now, which is home telephone service," Montgomery said. "They have to find new ways to get the average customer to cover his cost. Most people can afford this.

"The second thing is they have to find ways to add value to business communications. One way to look at the cost of transmission is [as though it were] computer memory. On a cost-per-transaction basis, it's going down continually. The holding companies have to eliminate the restriction on enhanced services, and they have to look first to enhanced Centrex and protocol conversion."

Throughout the U.S., the regional holding companies are installing fiber-optic cable, some between central offices and some directly to customer sites, and are replacing electromechanical central office switches with digital switches.

For example, Pacific Bell Telephone Co., the Pacific Telesis Group operating company in California, used the 1984 Summer Olympics in Los Angeles and the 1984 Democratic National Convention in San Francisco as opportunities to install fiber-optic cable in those cities. Pacific Bell ran 300 miles of fiber-optic cable among Olympic sites and 110 miles of fiber-optic cable to serve convention facilities in San Francisco. After the events, the cable was turned over to general service uses.

A Pacific Bell spokesman said 55% of the circuits between the company's central offices are now digital and that the figure will be 93% in 1992. He said 60% of Pacific Bell's 10.9 million access lines are served by software-controlled, computerized switches and that the number exceeds 90% in urban areas.

Pacific Bell, like other divested Bell operating companies, wants to offer switched digital service at 56K

bit/sec in addition to dedicated digital services up to 1.54M bit/sec.

In the nation's growth belt, the regions served by Bell South and Southwestern Bell Corp., the divested Bell operating companies have found that if they must wire new developments, they might as well run fiber-optic cable at a cost 10% below the cost for copper cable and offer bandwidths of 135M bit/sec.

Bell South is promoting services such as Lightgate, a fiber-optic service installed directly into a customer site for integrated voice, data and video services.

Meanwhile, in the more mature areas in the Northeast and Midwest, there is less demand for new lines, so regional holding companies such as Nynex Corp. are installing some fiber-optic cable, particularly among central offices, but are concentrating more on upgrading their switching facilities to increase the functions those central offices can offer.

Going with digital switches

New England Telephone Co. reported that it is replacing its central office switches with digital switches. A spokesman said only 13 of 685 New England Telephone switches were digital on Jan. 1, 1984, but that 56 will be digital by the end of 1985, with most of the new installations concentrated in population-intensive and business-intensive eastern Massachusetts and Rhode Island.

In the Midwest, American Information Technology also has a limited growth problem on its hands. There, too, much of the effort has been placed on upgrading the switching capability, with the apparent goal not only the ISDN that all of the regional holding companies and AT&T discuss so frequently, but also a new generation of Centrex services.

New Centrex, with the functions of a private branch exchange or other enhanced services such as protocol conversion or Pacific Bell's proposed Intellicom customer-controlled network may be to some regional holding companies a key to stopping bypass moves as large and even medium-size companies look for savings and new features in private links to long-haul carriers — all at the expense of the operating companies.



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NEWS

Chip industry slump brings on layoffs, workweek cuts

Intel anticipates plummeting profits; Micron fires 600

By Kathleen Burton
CW West Coast Bureau

The dismal beat of the semiconductor industry slump droned on last week as Intel Corp. announced it might not earn any profit for the first three months of 1985.

In addition, Texas Instruments, Inc. said it is extending a reduced workweek at its domestic and international semiconductor plants through mid-1985. And Boise, Idaho-

based Micron Technology, Inc., a specialty memory chip maker, said it will fire half of its 1,250 employees in reaction to softening market demand.

Lack of chip demand causes slump

Intel, which last quarter earned \$23 million on sales of \$416 million, cited continued weakness in semiconductor demand for its anticipated depressed results this quarter. The company recently laid off 900 workers in a cost-cutting move, its first layoff in 10 years.

A TI spokesman would not reveal which installations would be affected by the extension of a shortened workweek, but said the workweek

reductions would primarily be overseas.

The cost-cutting measure was due to weakened orders and intensified pricing pressures, the spokesman said, and the company would make no predictions about when the market would improve. The company laid off 2,000 workers in October.

More layoffs expected

Industry watchers said more layoffs are expected among Silicon Valley semiconductor firms as the volatile semiconductor market corrects itself after a period of soaring and then plummeting chip demand that began in 1984. After ramping up capacity early last year, integrated cur-

cuit manufacturers now face high personnel and equipment overheads, with minimal cash infusions to correct the situation, they said.

Jan Lewis, a semiconductor industry analyst at Infocorp, a market research firm in San Jose, Calif., said that industry improvements cannot be expected until the second or third quarter. Lewis echoed other analysts, who blamed the weak market on end users working off excessive semiconductor inventories and a general market contraction due to the sluggish personal computer market. "It's a famine and a glut mentality we're seeing in semiconductors," Lewis said, "but the worst is almost over."

U.S. stalking Japan's telecom mart

WASHINGTON, D.C.— A high-level tug-of-war between Japan and the U.S. over the ability of U.S. exporters to enter Japan's soon-to-be-deregulated telecommunications market may affect the availability of Japanese goods in the U.S.

Last week U.S. Commerce

Department Secretary Malcolm Baldrige called off at the 11th hour a planned visit to Japan by Lionel Ulmer, the department's Undersecretary for International Trade, in an apparent effort to put pressure on the Japanese government to guarantee U.S. firms access to Japanese markets when the state telephone monopoly, Nippon Telephone & Telegraph Corp. (NTT), is deregulated April 1.

Baldrige said the talks on opening Japanese telecommunications markets to U.S. companies have the highest priority with the U.S. government. He said it appeared the Japanese wanted to set up a special technical review committee to handle certification of U.S. telecommunications products for use in the NTT system and would require individual certification seals for each shipment of goods to Japan. Baldrige said this position is unacceptable to the U.S.

Meanwhile, the Federal Communications Commission has quietly begun a staff investigation to study options for using the FCC's Part 68 equipment registration rules for certifying telecommunications equipment imported to the U.S. as a means to help ensure similar equal treatment in foreign markets.

The FCC has made clear that the study is not solely aimed at Japan but at all foreign markets where U.S. goods face trade barriers.

The impetus for increasing the trade pressures on Japan has been prompted by the growing dollar volume of that country's imports into the U.S. since the divestiture of AT&T.

The value of Japanese telecommunications imports has jumped from \$600 million to \$2 billion since the divestiture, while U.S. exports remain at \$300 million, according to Commerce department figures.

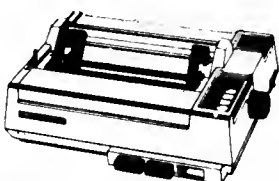
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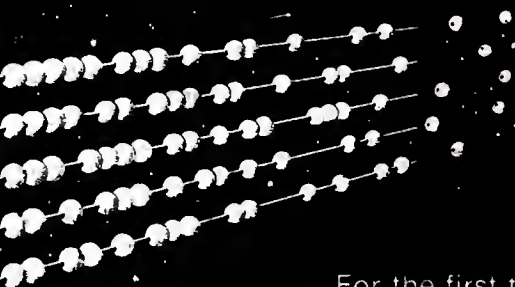


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NEWS



WASHINGTON UPDATE

Mitch Betts
CW Washington Correspondent

GSA aims to lessen agency system tests

WASHINGTON, D.C. — The U.S. General Services Administration (GSA) plans to discourage federal agencies from conducting costly and troublesome benchmark tests to evaluate computer systems.

"Benchmarks shall not be used unless the requiring agency determines that there

is no other acceptable means of performance evaluation," said the GSA's proposed rule, issued Feb. 22.

The GSA said it will amend its procurement regulations to allow agencies more freedom in selecting and using computer evaluation techniques, such as the review of technical literature, simulation and benchmarking. The evaluation technique should be chosen on a case-by-case basis, weighing the "risks of adverse impacts on agency missions" of acquiring undersized or oversized computers, the GSA said.

The GSA's action was prompted by a 1983 U.S.

General Accounting Office report, which urged the GSA to give agencies better guidance about benchmarking. The report said benchmarks typically cost between \$50,000 to \$200,000 and are frequently criticized because they can be manipulated to limit competition.

Trainee feedback called key to CBT

ROSSLYN, Va. — Computer-based training (CBT) software products should have interactive features that give feedback to trainees about whether they are learning the lessons, a training expert told the Association of Federal Computer Users (AFCU) last week.

Lori Gillespie, vice-president of Instructional Commu-

nications, Inc., a Baltimore-based consulting firm, provided that and other tips for attendees at the AFCU's Information Center Special Interest Group meeting here. The information center directors sought advice on how to select off-the-shelf products that train novice computer users.

At the forum, the information center directors complained that some CBT packages are inaccurate, too easy and merely provide on-screen text with no user interaction. Gillespie suggested several guidelines for evaluating CBT products, including the following:

■ CBT software should

provide documentation that describes the overall course, its training objectives, target users, prerequisites and the time needed to complete the course.

■ The product's content should be accurate, current, logically sequenced and modular (so users can review course segments without reviewing the whole course).

■ The CBT software should provide "frequent and meaningful interaction" with the trainee and give students feedback on whether their responses are right or wrong. "The student's interaction should be more than just hitting the key for the next screen," she said.

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Special Report article contributions are welcomed and may take one of two forms: a tutorial article discussing an issue or trend or an application story outlining a particular user firm's experience with automated manufacturing.

Articles must be typed, double-spaced and range in length from four to six pages. Artwork, such as charts, graphs and photographs, is welcome.

Authors should include brief biographies and telephone numbers at which they can be reached.

The deadline for submissions to the Special Report is March 27.

If you have a story or questions, send them to Janet Fiderio, Special Report Editor, *Computerworld*, Box 880, 375 Cochituate Road, Framingham, Mass. 01701.

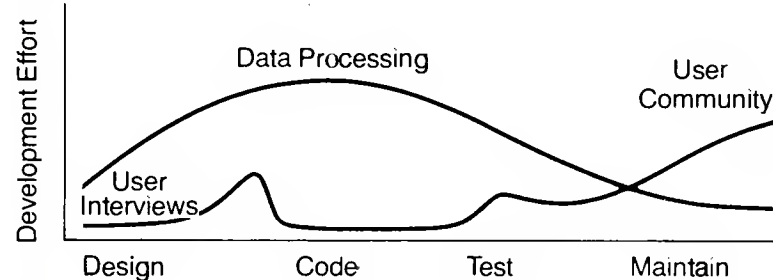
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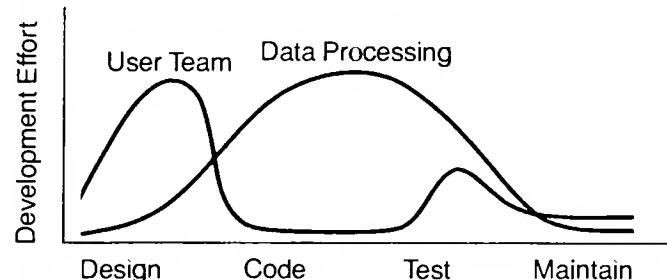
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NEWS

ICCP attempts to rectify certification exam mix-up

By Donna Raimondi
CW Staff

CHICAGO — The Institute for the Certification of Computer Professionals (ICCP) is still struggling with the effects of a printer's error that switched covers on two of its exam booklets.

Applicants for the Certificate in Computer Programming (CCP) who last Dec. 8 took either a business test or a systems test were given exam books with covers that did not correspond to the inside sections, said George Eggert, executive director of ICCP. Approximately 130 people took the faulty versions, he said. Some of the applicants caught on, and others did not, he added.

Some of the test takers in Chicago and Los Angeles reported the error to their proctors, who, in turn, called the testing company and received instructions on reversing the covers, Eggert said. The mistake did not get caught at several smaller testing sites, he said.

James Means of the Computer Task Group of Cleveland said he took the test in Akron, Ohio, and flunked. He said he waded through scores of tough questions, wondering why the ICCP would throw in so many hard ones, and then he came across an insert that pointed out a flowchart error. On the instructions for fixing the

error, the insert mentioned question numbers in the different versions of the test, which led Means to discover he was taking the wrong exam. Following the test proctor's advice, he finished the test and called the testing company the following Monday.

The insert sheet explaining the flowchart error also clued in a data dictionary administrator in Rochester, N.Y., who passed the systems test, even though he thought he was taking the business test. "I felt kind of stupid, thinking, 'Do I really know as little as I seem to know?'" he said.

The first half of the CCP exam asked general questions that apply to all test takers, the Rochester programmer said. The second 60 ques-

tions related specifically to a specialized field, such as systems or business, with the systems portion applying heavily to operating, telecommunications and paging systems and the business section asking Cobol-oriented questions.

"The ones who passed were very knowledgeable about programming in general," Eggert said. ICCP has arranged for those who did not pass to take the exam again. "Most people were nice about it, but we had a few chew us out," he added. For the 12 or so people who wanted it, ICCP refunded money, he added.

Taking the test the second time is not that easy, Means said. He said he called Educational Services for the

Professions in Kentucky, the testing company for ICCP, about 12 times trying to set up an appointment. After several weeks of calling Kentucky and one call to Eggert at ICCP headquarters here, Means said he finally received a letter last week that he had flunked the test, along with an invitation to take another one.

In the meantime, he found his own proctor and set up his own second exam. He is now waiting for the Kentucky firm to send the exam to his proctor so he can continue on with the certification process. "This [certificate] was on my personal goal sheet for 1984 — now it is pushed up until halfway through 1985," he said.

ACM conference to cite systems' human factors

SAN FRANCISCO — The Conference on Human Factors in Computing Systems is scheduled for April 14-18 at the Hyatt Regency Hotel at Embarcadero Center here.

This conference is sponsored by the Association for Computing Machinery's (ACM) Special Interest Group on Computer and Human Interaction.

The meeting will consist of presentations of papers, panel sessions and users group sessions.

There are 31 papers scheduled to be presented at the following 10 sessions: System Response Factors, Touching and Seeing, Psychology of Programming, Menu Systems, Design and Evaluation, Naming, User Assistance, Managing the User Interface, Speech I/O and Cognitive Issues.

Seven panel discussions are planned: Utility of Natural Language Interfaces, Psychological Research Methods in Human Use of Computers, Interfaces in Organizations, Supporting Group Work, Social and Cultural Impact of Technology, Communicating with Sound and Human Factors in Systems Design.

Scheduled interest groups consist of Technology Transfer, Role of Human Factors Specialists in Computer Companies and Interactive Aids for Problems Formulation.

Registration fees range from \$120 to \$180, and tutorial fees vary from \$65 to \$110.

ACM Conference Management is located at 11 W. 42nd St., New York, N.Y. 10036.



NEWS

NSF picks sites for supercomputer funding

WASHINGTON, D.C. — The National Science Foundation (NSF) last week announced that four supercomputer centers will receive a total of \$200 million in government grants spread over five years.

The winners from among 22 applicants in the competition were the following schools: the University of California at San Diego, the University of Illinois at Urbana-Champaign, Cornell University in Ithaca, N.Y. and Princeton University in New Jersey.

The supercomputer centers at the University of California at San Diego and the University of Illinois at Urbana-Champaign will receive Cray Research Corp. Cray XMP supercom-

puters. The Cornell center, called the Center for Theory and Simulation in Science and Engineering, will receive an IBM 3084 Model QX mainframe attached to Floating Point Systems, Inc. FPS 164 and 264 scientific processors.

The Princeton supercomputer center, called the John von Neumann Center, will receive a Control Data Corp. Cyber 205, which will be upgraded to an ETA Systems, Inc. ETA-10 in 1987. CDC is a part owner of ETA.

Consortium members

The University of California at San Diego and Princeton centers will be members of consortiums that will

include other universities and institutions. The Princeton consortium will include 12 members, and the San Diego consortium will have 18 members.

The centers are scheduled to be operational in late 1985 or early 1986. Congress authorized funding for the grants to spur the availability of advanced scientific computing resources for research scientists and engineers.

In a separate announcement from the government grants, IBM said that it will contribute \$30 million in software, hardware and services to the Cornell supercomputer center, including a 3084 Model QX mainframe along with service and maintenance.

Study cites need for U.S. R&D funding

By Mitch Betts
CW Washington Bureau

WASHINGTON, D.C. — Major advances in the fields of computer architecture, AI and fiber optics will require increasing financial support from the U.S. government for basic research, according to a major study by Congress' Office of Technology Assessment (OTA).

The National Science Foundation's supercomputer program to give researchers greater access to supercomputers is a step in the right direction, the OTA report said. Last week, the foundation announced it would place supercomputers at four universities (see story left).

Steps like this will be necessary to respond to aggressive, government-coordinated research efforts in foreign countries, such as Japan's Fifth-Generation Computer Project, according to the OTA. Foreign competition and the growing importance of computers and communications technology to the U.S. economy and security "suggest that more attention should be paid by policymakers to the needs for [research and development] in information technology," the OTA concluded.

In response to these new pressures, industrial support is growing for short-term applied R&D, the congressional agency noted, but industry still looks to the academic community to perform and to the U.S. government to fund the long-term basic research that will underlie future technological advances.

For example, basic research on fiber optics is needed to increase the information-carrying capacity of the fibers, to increase the transparency of the fibers, to allow longer distances between repeaters and to improve processes for manufacturing fibers, according to the OTA.

"Increased federal funding of research in universities would achieve the dual objectives of stimulating fundamental research and training people at the [doctoral] level in fiber-optics technology," the OTA said.

In the AI field, the agency cautioned against engaging in research designed to achieve quick, exciting results, noting that "much basic science remains to be learned in AI, and steady, long-term support is required for that learning."

The AI field is experiencing an acute shortage of researchers as university faculty members are drawn off campus by industry, the agency added, just at the time when demand for newly trained graduates is growing rapidly.

The Department of Defense is responsible for nearly 80% of the federal support for R&D, but according to the OTA, many science policy specialists question this dominance. Specialists interviewed by the agency said they were very concerned that military work is siphoning off too much talent from civilian applications and that much of the military research in information technology does not have commercial applications.

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NEWS

Merger with Chevron would obsolete Gulf's DP center

Shutdown could force 900 workers to relocate

By Jeffry Beeler
CW West Coast Bureau

If the federal government formally okays the proposed merger of Chevron Corp. and Gulf Oil Corp., Gulf's two main computing operations and its credit card processing activities will cease to be necessary and will eventually be dismantled.

In the resulting data center shutdowns, much of Gulf's current applications portfolio will be transferred to Chevron. The rest will go to Standard Oil Co. of Ohio (Sohio), which hopes to acquire Gulf's business in the Southeastern U.S.

The closings will also force the nearly 900 computing professionals now employed in Gulf's MIS organization either to relocate thousands of miles to Chevron or to look for work elsewhere.

Within Gulf, reaction to the potential shutdowns and job transfers "runs the full gamut from excitement to disappointment," according to John Framel, executive director of the company's Information Resources Department. "Some people believe the combined Chevron-Gulf organization is going to be a tremendous place to work. Others [said] their professional ambition lies in another direction and are unwilling to leave their current homes."

Jim Gerhardt, executive director of Gulf's Information Services Division, painted a fairly pessimistic picture of the mood among the firm's systems staff. According to Gerhardt, the majority of the staff has greeted news of the proposed merger

somewhat negatively. Many Gulf employees — both DP personnel and non-DP personnel alike — feel "let down by upper management. They never imagined that anything like this merger, which is the largest in corporate history, would ever occur," he said.

Gulf currently operates a large data center in Houston, a smaller center in Pittsburgh and a credit card processing installation in Atlanta. In all, the three sites employ 765 MIS specialists in the company's Information Systems Division and another 130 or so in its Information Resources Department.

If the proposed merger is approved by the Federal Trade Commission as expected, most of those employees will eventually be asked to transfer to Chevron's two main data centers in the Northern California communities of San Ramon and Concord. Staff members who comply with the request will be guaranteed new jobs in any combined Chevron-Gulf computing organization, Framel said.

However, not all of Gulf's systems personnel will be so lucky. A substantial minority, especially those at the very highest and very lowest rungs of the MIS ladder, may not be offered any new jobs at all, Gerhardt said.

Moreover, even some of the employees that do receive such offers may decide for one reason or another not to accept them. Either way, at least a portion of Gulf's current MIS work force will almost certainly fall

See CLOSING page 16



Framel



Oldenburg

AT A GLANCE

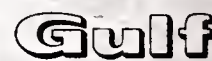
CHEVRON CORP.

Corporate headquarters - San Francisco
Processing centers - San Ramon, Calif.; Concord, Calif.
Mainframe models - 12 IBM 3081s
Annual MIS budgets* - \$140 million
Number of MIS employees - 1,300
Processing style - Highly centralized
Nature of typical systems - Interactive with integrated data bases



GULF OIL CORP.

Corporate headquarters - Pittsburgh
Processing centers - Houston, Pittsburgh, Atlanta
Mainframe models - IBM 3033s, 3083s, 3081s
Annual MIS budgets* - \$120 million
Number of MIS employees - 900
Processing style - Highly centralized
Nature of typical systems - Batch



*Excluding data entry and scientific processing

MERGER from page 1

zations, the Chevron-Gulf merger will consist of at least the following three major elements:

- The transfer of Gulf's information systems personnel from their Houston, Pittsburgh and Atlanta workplaces to Chevron's two Northern California data centers.

- The gradual assimilation of many of Gulf's existing applications into their Chevron counterparts.

- The marriage of Gulf's Information Services Division and Information Resources Department with the corresponding sections of Chevron's Computer Services Department.

"Most of the integration will probably be completed within about two years, but we may need as long as five years to finish the last 10th of a percent," Oldenburg predicted.

By the time the union of Chevron's and Gulf's MIS organizations is finally consummated, Oldenburg said he expects the Computer Services Division's processing volume to grow from 250,000 to 350,000 transactions per day and its IMS data base capacity to double. To the credit card side of Chevron's existing applications, meanwhile, acquiring Gulf's computing operations will add roughly three million new customers.

As a crucial component of the merger, the fusion of the two oil companies' MIS operations will undoubtedly

be no organizational picnic. On the other hand, the process will have a number of important factors working in its favor.

Stroke of sheer good fortune

By a stroke of sheer good fortune, announcing the two firms' desire to merge preceded by only a few months the Computer Services Division's recent move into a new, greatly modernized data center here. Occupied last July and situated in the newly constructed Chevron Park office complex, the data center forms half of the company's MIS nerve center. The other half lies a few miles away at Chevron's existing computing facility in Concord, Calif.

Two or three years ago, when Chevron Park was still on the drawing board, the two Northern California data centers were projected to meet the Computer Services Division's growth needs for the next 10 years. Since then, the news of a possible merger with Gulf and its internal systems organization has necessarily forced Chevron to downgrade its original estimate. Even so, the San Ramon and Concord installations are thought to be large enough to hold a combined Gulf-Chevron MIS operation at least through the end of the decade, Oldenburg said.

"The decision by Chevron and Gulf to combine their operations

See MERGER page 15

Acquisition to require 25% hike in computing power

By Jeffry Beeler
CW West Coast Bureau

Recent projections concerning Chevron Corp.'s proposed acquisition of Gulf Oil Corp. have reaffirmed Chevron's faith in centralized processing and its attendant economies of scale.

Federal approval of the takeover bid would set into motion the largest merger in U.S. corporate history. In one fell swoop, the proposed deal would combine the companies' work forces, each of which numbers more than 40,000 employees, and would swell Chevron's annual revenues, now about \$27 billion, to more than \$50 billion.

But even though Chevron's overall business may soon double overnight, the firm fully expects to be able to meet all its future service needs with just a 25% increase in mainframe processing power, said Chuck Oldenburg, Chevron's general manager of computer services. The company will also be able to limit to 20% the foreseeable growth in its MIS hiring requirements, he added.

What makes such comparatively modest growth in systems resources possible is the two

companies' strong, long-standing biases toward centralized processing. Both Gulf and Chevron have consciously steered clear of distributing large amounts of their mainframe computing power, Oldenburg said. Instead, the firms have concentrated the bulk of their CPU capacity in a handful of large corporate data centers.

Extremely favorable economies of scale

This MIS centralization, in turn, has yielded extremely favorable economies of scale, as the proposed Chevron-Gulf merger graphically demonstrates. When the expected takeover is complete, Chevron will be able to satisfy completely both its own and Gulf's information processing needs from its two existing data centers in Northern California, Oldenburg predicted.

In other words, even though user demand for its services may soon mushroom, Oldenburg's department foresees no need to co-opt and maintain any of the major processing centers currently operated by Gulf.

"I was really flabbergasted," Oldenburg re-

called, when he sat down recently to study the proposed merger's impact on Chevron's MIS organization and arrived at the above projections.

For Oldenburg, Chevron's ongoing bid to acquire Gulf provides an object lesson in the inherent strengths of centralized processing. "A lot of the people who believe in decentralized data centers fail to appreciate the real virtues of centralization and economies of scale," he said.

Between its two corporate data centers, Chevron currently operates a total of 12 IBM 3081s, some running under MVS/XA and others under VM. Six of the 3081s form the hub of what Oldenburg describes as perhaps the world's largest in-house time-sharing network. At any given moment, he said, the network simultaneously serves as many as 1,000 of its 12,000 total subscribers.

Large as it is, though, Chevron's CPU collection will soon expand to meet the increased user demand that will inevitably follow the company's merger with Gulf. During the next two years or so, Chevron plans to acquire three additional 3081s

See CENTRAL page 16

NEWS

MIS execs' jobs caught in squeeze

Chevron Corp.'s disclosure that it intends to acquire most of Gulf Oil Corp. casts a shadow of uncertainty over the immediate career outlook of Gulf's two top systems executives.

Despite Chevron's assurances that they run no risk of displacement, both managers are not optimistic about their chances of landing top positions in the combined MIS organization that the proposed takeover would inevitably create.

Possibly caught in the squeeze between the two converging oil industry giants are Jim Gerhardt and John Framel, who serve as executive directors of Gulf's Information Services Division and Information Resources Department, respectively.

At the moment, Framel heads an operation that identifies key business needs and serves as an intermediary between the corporation's end users and its technical support staff. Gerhardt, on the other hand, currently oversees an organization that embraces all of Gulf's applications development activities and most of its central systems resources.

But if the two firms and their MIS operations someday merge, both Gerhardt and Framel might suddenly find themselves cast by the wayside as Chevron and Gulf consolidate equivalent functions to avoid duplication.

In that event, the pair would lose not only their current positions at Gulf but also an opportunity to seek substitute employment with Chevron, where most of the top MIS management slots are already filled.

"Obviously, there would be no need [in a consolidated systems organization] for two heads of data processing," Gerhardt said.

Framel's and Gerhardt's pessimism over their near-term job prospects puts them somewhat at odds with recent statements by Chevron's chief systems officer, Chuck Oldenburg, who expects the proposed merger to create major openings for both Gulf executives.

"The titles they would hold and the roles they would play might be different from what they have now," the general manager of Chevron's Computer Services Department (CSD) conceded. "We won't know for sure until we complete a new organizational chart."

In all likelihood, Gerhardt would be assigned a management position somewhere in the CSD, while Framel would go into Chevron's finance department, Oldenburg said.

Both Gerhardt and Framel stop short of contradicting Oldenburg's forecasts and have yet to abandon entirely their hopes that Chevron somehow would make room for them in its postmerger executive ranks. But each seems to be hedging his bets.

"I think Gulf's senior management pretty well recognizes that in a merger of this size, the opportunities at the top are limited," certainly much more so than among middle-level computing professionals, Framel said.

MERGER from page 14

came at a very propitious time," Oldenburg said. "We were just lucky that it didn't happen two or three years earlier when we were still in very cramped quarters and had no plans to move."

Another factor that promises to aid the merger of Chevron's and Gulf's MIS organizations is their high degree of systems compatibility. Both are confirmed IBM shops (see chart page 14), operate extensively — although not exclusively — in an MVS environment and liberally use large IMS data bases, Oldenburg said.

In other important respects, however, the two MIS organizations differ substantially. Chevron's operation, for example, is characterized by a heavy emphasis on on-line, interactive applications and integrated data bases. Gulf, by contrast, still relies primarily on antiquated batch systems, according to John Framel, executive director of Gulf's Information Resources Department.

One of the main missions of the Chevron-Gulf task forces, therefore, will be to evaluate the two competing sets of applications "with an eye to ultimately having only one application to support a given area of business,"

Oldenburg said.

Once the evaluation process is complete and the two sets of applications have been merged, the results more often than not will look far more like Chevron's current systems than Gulf's. Payroll, credit card processing, purchasing and oil field accounting are only a few of the many existing Gulf applications that are earmarked for updating and subsequent inclusion in their Chevron counterparts, Oldenburg said.

Not all of Gulf's current systems, however, are smaller or technologically inferior to the Computer Services Division's. Nor are Gulf's applications universally destined to be swallowed up by their nearest Chevron equivalents. On occasion, exceptional circumstances might prompt opposing pairs of Computer Services Division and Gulf applications to reverse their usual roles, with the latter side assuming the dominant position in a systems merger.

Gulf's terminal data automation system, for example, "is probably more advanced than anything that Chevron has" and will likely emerge from the integration process greatly expanded but basically unchanged, according to Jim Gerhardt, executive director of Gulf's Information Services Division.

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NEWS

CLOSING from page 14

by the wayside in any upcoming effort to transplant the firm's data center activities to Chevron.

An exact timetable for the planned merger of the two companies' computing operations has yet to be finalized.

"According to the latest information that has come to my attention, the Chevron data center in San Ramon is tentatively scheduled to be processing Gulf's applications by the end of the year," Gerhardt said.

One factor that might delay a possible marriage of the two companies' MIS activities is an existing service agreement that obligates Gulf to supply Sohio with six month's worth of information processing assistance, he added. When the service period expires, the two parties can exercise an option to renew their agreement in three-month increments.

The way in which the proposed divestiture to Sohio ultimately resolves itself is expected to have a direct bearing on both the substance and timing of Gulf's prospective union with Chevron and its main systems group, the Computer Services Department.

Once the proposed merger is under way, the final fate of Gulf's MIS employees will hinge in large measure on their current rank in the professional pecking order, Gerhardt said.

Operations specialists' prospects dim

Job opportunities appear least promising for the company's lower echelon systems employees, like operations specialists, who are unlikely at this point to find a place in Chevron's soon-to-be-expanded computing operation.

Somewhat brighter are the short-term career prospects of the professionals at the opposite end of Gulf's MIS job spectrum, the top systems managers, whose possible futures with Chevron will be decided "case by case," Gerhardt said.

Without question, the workers who stand the best chance of emerging from the proposed merger unscathed will be Gulf's intermediate-level MIS employees, such as programmers, almost all of whom are expected to be offered comparable

positions in the Computer Services Department.

"We need all the Gulf systems people we can get," said Chuck Oldenburg, general manager of Chevron's Computer Services Department. Ol-

Gulf's JES3-oriented systems. The problem with such an acquisition is that no one in the Computer Services Department, a JES2 shop, knows very much about JES3, Oldenburg said.



Within Gulf, reaction to the potential shutdowns and job transfers runs the gamut from excitement to disappointment.

denburg's sentiments apply particularly to Gulf's IBM JES3 specialists, who almost certainly will play an important role in the integration of the two companies' MIS operations.

As a consequence of the expected merger, Chevron will inherit many of

So Chevron is working hard these days to try to persuade as many of Gulf's existing JES3 experts as possible to relocate.

Among its various inducements, Chevron recently introduced a program in which the company agrees to

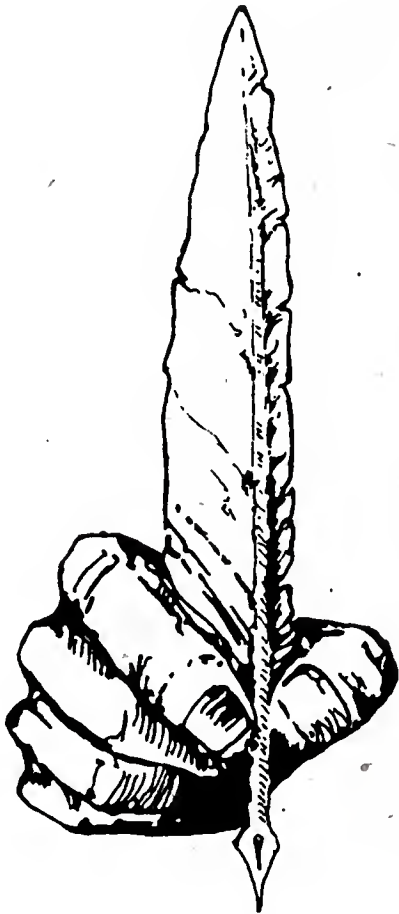
cover most of any loss stemming from the sale of a transferred employee's house, Oldenburg said.

In the end, the firm is expected to offer new jobs to 75% or 80% of Gulf's current MIS work force. But despite Chevron's efforts to make relocation relatively painless, only an estimated 30% or 35% of the employees are likely to accept their offers, Framel said.

The reason for the predicted low acceptance rate has to do partly with California's astronomical housing costs and with the highly favorable MIS job markets in the three cities where Gulf currently maintains processing sites.

For the Gulf MIS workers who the impending merger will leave unemployed, the company will provide severance pay and establish a job-placement service, Framel said.

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CENTRAL from page 14

to raise its total mainframe count to 15, Oldenburg said.

At the same time, the firm plans to enlarge its number of terminals by 50% and its Dasd capacity by 70%, he added. Compared with the projected increase in the size of Chevron's applications, neither predicted growth rate is particularly startling, Oldenburg said.

On the other hand, installations of both Dasd and terminals are expected to grow at a far brisker clip than the company's mainframe processing power.

The reasons for the disparity are fairly straightforward, Oldenburg said. First, Chevron will need a substantial increase in storage capacity to absorb the large volume of historical records it will undoubtedly inherit from Gulf, he said.

Second, the firm will have to expand its networking capabilities to encompass "all of Gulf's oil fields and marketing facilities in Texas, where Chevron currently has none of either," he added.

NEWS

Cost-effective links, nets top conferees' wish lists



CW AT
INFO/CENTRAL

By John Gallant
CW Staff

CHICAGO — The computing power is in place, but the means by which to tie disparate processing environments together was on the minds of visitors to the recent Info/Central: The Information Management Exposition & Conference and Info/Software conference held here.

While the buzzwords "microcomputer-to-mainframe link" and "local-area network" are currently in vogue, attendees at the joint conference told *Computerworld* they have seen little in the way of cost-effective implementations of those emerging technologies.

Larry Pollard, systems analyst with 3M Corp. in St. Paul, Minn., said one of his company's most pressing concerns is the vertical integration of its computing resources.

According to Pollard, who evaluates micro hardware and software and communications links from those systems to 3M's host processors, the current generation of link products is too costly and too difficult to implement.

"We want to be able to talk transparently from the micro to the host," Pollard said. "Right now, I can write a program for that type of data transfer. But that manual process takes too much time. Software that would allow us to do that in a flexible manner would be a real boon to productivity."

Pollard works primarily with the cost accounting organization within 3M. The group currently maintains a fleet of about 330 IBM Personal Computers, including roughly 50 IBM 3270 Personal

Computers. Pollard said 3M's goal is to tie those micros to the company's IBM 370 series hosts.

"We are committed to the idea of micro-mainframe links," he said. "But we do not want a link that becomes just another operational or cost center. We are hoping to find a transparent, flexible, inexpensive link. We have not seen that type of product yet."

H.G. Sachleben said his company, Trailmobile, Inc. of Chicago, also hopes to find a viable micro-mainframe link. As director of information systems for the tractor-trailer manufacturer, Sachleben's aim is to link the company's 24 IBM Personal Computers to an IBM 3033 host. Trailmobile's link difficulties are exacerbated by the fact that the micros are spread throughout the country.

"The big issue for us is the micro-to-mainframe link for integrating our systems," Sachleben said. "It seems there has been a real proliferation of links lately, but all of them are new and have not yet been tested or proven. We just do not know how they work in a production environment. In addition, many of the links are only to the vendor's own data base [management system]."

'Buyer beware situation'

"Lots of vendors are saying they have a better mousetrap," he continued, "but for the prospective link user it is a 'buyer beware' situation."

The issue of local-area networks seems to have spawned as much user concern as that of micro-mainframe links.

"The cost-effectiveness of local-area networks is a real issue for us," said Paul Ansfield, professional staff consultant with the Oshkosh, Wis.-based Kane Institute for Information Systems and Automation. "So much about local nets is unclear to users, yet they have to make intelligent decisions on that rapidly moving technology."

Ansfield serves as a management trainer and consultant in the selection and installation of micro applications for business, finance and industry. Because local-area network technology is so new, Ansfield said, in most cases management cannot simply rely on the data processing department for guidance.

Future dependent on war between IBM, AT&T

"Some local nets are too costly, others do not deliver what they promise," he said. "Standardization is also a big concern. What the future holds depends in large measure on the war between IBM and AT&T."

"The technology requires a great deal of understanding for the average businessman. But you cannot rely on the DP manager alone for information and to make the hard choices that have to be made. This is all new technology."

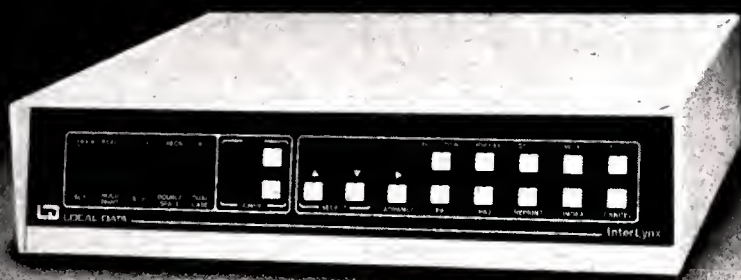
Networking, on a much wider scale, was also the concern of Jerry Kenney, a telecommunications specialist with Electronic Data Systems Corp. (EDS), the recently acquired subsidiary of General Motors Corp.

Based at Fort Sheridan, Ill., Kenney is involved in EDS' efforts to develop a worldwide computer network for the recruiting services of the U.S. Army. To support the proposed network of Prime Computer, Inc. processors, Kenney said, EDS is researching available third-party networking software.

"We are looking for information on how best to network — literally worldwide," Kenney said. "EDS is studying what is available in the way of networking software or services. Compatibility is the big problem."

Incompatibility of different systems makes it so difficult to choose products. I know standards are coming, but they are just not coming fast enough."

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NEWS

Prototyping seen as tool for applications refinement



CW AT
INFO/CENTRAL

By John Gallant
CW Staff

CHICAGO — In Lee Adamski's opinion, developing a good quality application that meets user requirements is similar to drawing a beer from a tap — it is nearly impossible to do it right the very first time.

According to Adamski, manager of consulting and education for Applied Data Research, Inc.'s Ideal product line, that insight into human nature is one of the basic rationales for pro-

totyping during the design phase of the applications development life cycle. Adamski spoke on prototyping during a session at the recent Info/Software and Info/Central: The Information Management Exposition & Conference held here.

He explained that the term prototyping has come to represent diverse techniques ranging from designing a hard-copy sample of a report to creating full-blown systems with I/O, reports, screens, programs and populated data bases. Prototyping lately has come to be known by a variety of names, including iterative enhancement, heuristic development, evolutionary design, throwaway code, pilot software systems and planned

applications evolution.

Prototyping not new idea

Whatever the label, Adamski said, prototyping serves to refine applications functions, I/O during the design phase and allows end users to work with and evaluate a system before the development process is complete. While user awareness of prototyping has increased in the wake of so-called fourth-generation programming tools, the idea is certainly not new.

"Years ago, designers were creating mock-ups of reports, card layouts and, more recently, screen designs," Adamski said. "The idea of 'throw-away' code is certainly not new. We

have all seen our share of programs, design specifications and even full systems end up in the trash basket. We have been building prototypes ever since we started building systems. The prototypes were called failures."

To understand fully the role of prototyping in the applications development life cycle, Adamski said, it is important for MIS/DP professionals to know what prototyping is not. Prototyping is not a substitute for careful requirements analysis and applications design, nor is it an excuse for a development shop to abandon traditional structured design methodologies, thorough documentation and good, accepted programming techniques. More important, prototyping is not a magical solution to developing useful applications.

'Gives users something to work with'

What prototyping can do, he explained, is make it easier for developers to modify or improve an application before the complete system finally reaches users. "The prototype gives users something to work on with developers. Users have trouble expressing their needs without something to see," he noted.

"Currently, we ask users to review a complex [specifications] document and appraise the proposed system on paper. It is much easier to provide them with a working model because users cannot accurately assess a system until they have actually used it."

According to Adamski, some applications are more suitable for prototyping than others. Applications that are intended to be interactive and predictive — involving a constant set of requirements — and to employ a high degree of data manipulation and record management are good candidates for prototyping. Batch systems, applications that are nonpredictive, such as ad hoc query systems, and applications that rely heavily on algorithmic processes and extensive procedural logic are poor candidates.

A controlled process

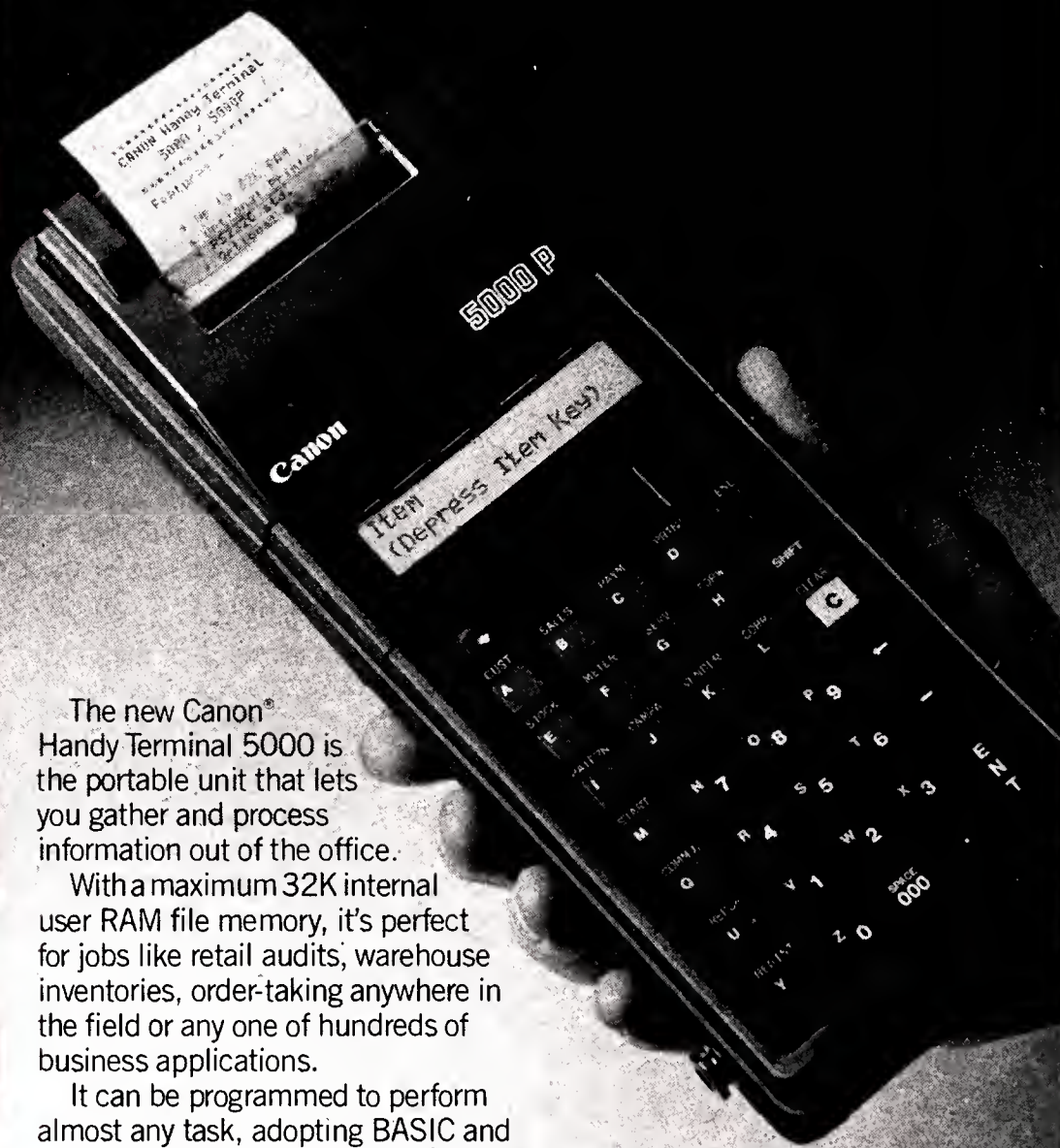
Despite the value of prototyping, he warned, its use must be tempered with discipline in a controlled process. That process should consist of an initial user/designer confrontation, a "first-cut" output phase in which the analyst builds initial system output models and a user review of the sample outputs that allows the user and analyst to refine the model.

The next phase involves additional prototype modification, which may be repeated several times within reasonable time constraints. Finally, after the data structures needed to support the proposed application are built, high-level program coding can begin.

After that? "Once the prototype is complete and the analyst and user have come to a reasonable agreement regarding system requirements, the more traditional activities of the system development life cycle — those not resolved by the prototype — are undertaken," Adamski said.

"The prototyping phase was only concerned with system functionality, with the [I/O] of a system. The less visible aspects of the application must still be dealt with and documented," he concluded.

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April 9, 1984

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Employee Name: Ms. Margaret Wells
Department: Marketing
Birthdate: 04SEP57
Sex: F
Marital Status: S
Number of Dependents: 0
Social Security Number: 242-23-3943

Home address: Apartment D
4905 Dana Drive
San Jose
95126-7634

Home phone: 555-7634

Work phone: N/A

Information about Employee's Spouse:
Spouse's Name: N/A
Spouse's Employer: N/A
Spouse's Employee: N/A

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Wilmington, NC 28402
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Blue Cross Blue Shield

Dependents Covered?
No
No

Life Insurance Information:
Type: Term
Amount: \$100,000
Policy Number: 123456789
Effective Date: 01/01/80
Expiration Date: 12/31/99
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Human Resources
JIT (4400)

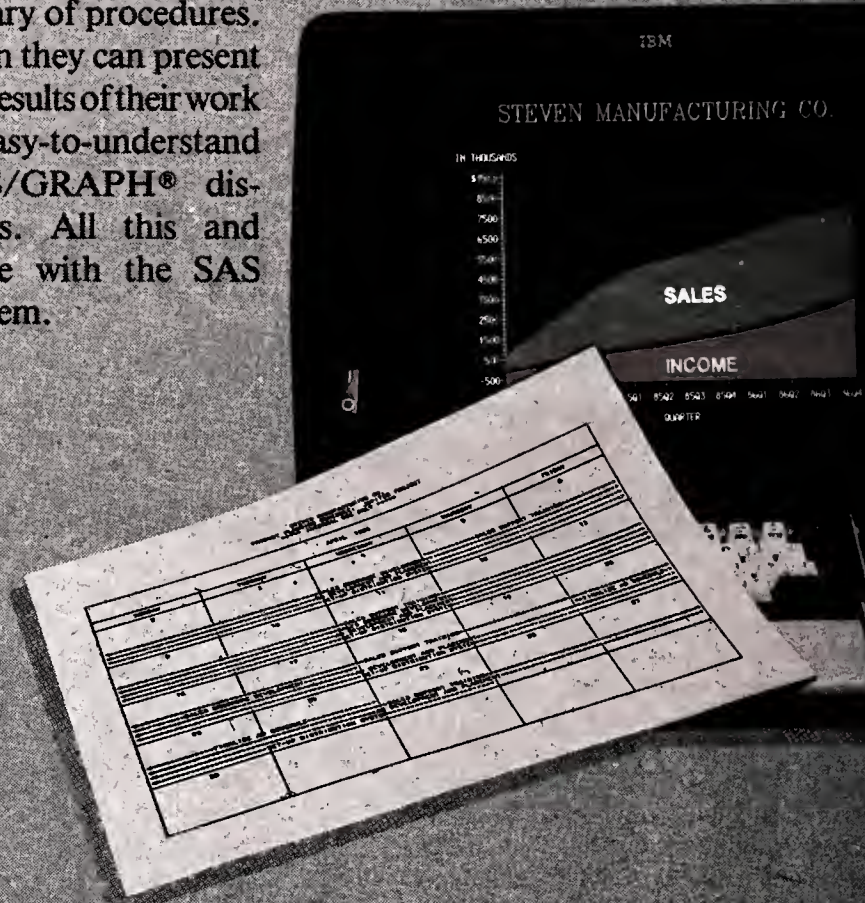
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Advertising	1,000,000	1,200,000	1,500,000
Public Relations	500,000	600,000	700,000
Direct Mail	300,000	400,000	500,000
Trade Shows	200,000	300,000	400,000
Other Marketing	100,000	200,000	300,000
Total	2,100,000	2,700,000	3,400,000

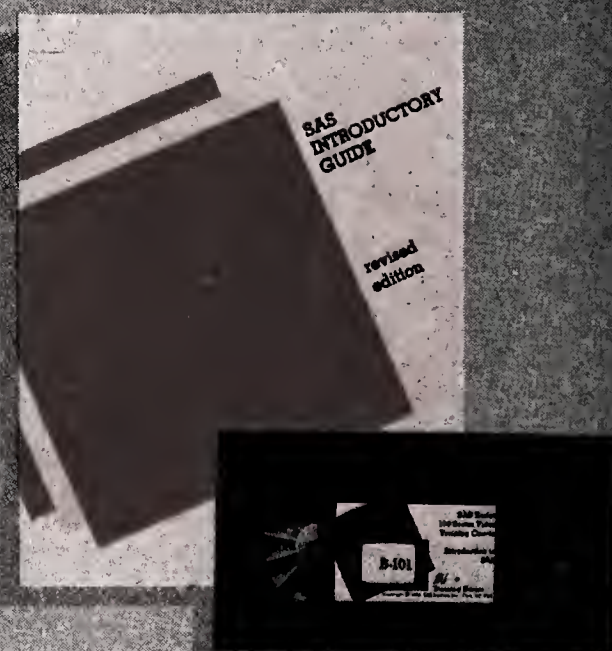
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Product	Q1	Q2	Q3
Product A	10000	12000	15000
Product B	8000	9000	11000
Product C	6000	7000	8000

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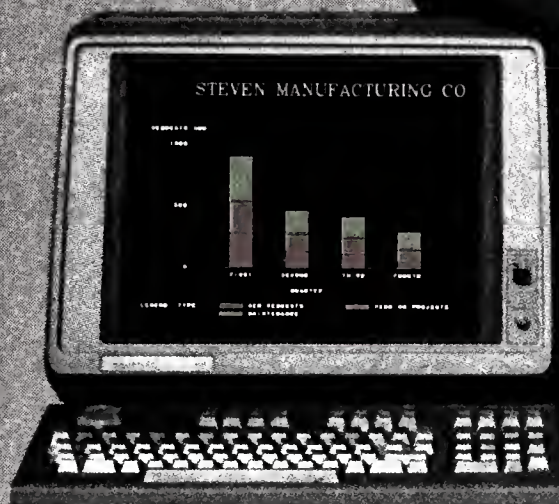
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FOR APRIL 9, 1984

DEPARTMENT	JOBNAME	CPU MINUTE		I/O COUNT	
		SUM	MEAN	SUM	MEAN
ACCOUNTING	JACCT110	3	31.32	10.44	11372
	JACCT210	7	38.97	5.57	34964
	JACCT220	8	103.99	12.99	74237
	OTHERS	25	113.76	4.55	56065
HUMAN RESOURCES	OTHERS	18	31.00	1.72	50314
	OTHERS	16	17.00	1.08	8218
MARKETING	JMK10170	3	31.35	10.45	13557
	JMK10200	9	165.36	16.15	159131
	JMK10215	8	82.33	10.29	43748
	JMK10220	7	67.61	9.57	132357
PLANNING	OTHERS	21	89.95	4.28	100580
	OTHERS	17	43.00	2.53	27479
PRODUCTION	JPROD200	12	80.47	6.71	107271
	JPROD500	7	170.00	24.29	89020
	JPROD650	4	58.35	14.59	91561
	OTHERS	24	142.18	5.92	108352
SYSTEMS	JSYS525	4	38.47	9.62	22519
	JYS620	4	24.62	6.15	19212
	JSYS700	4	47.36	11.84	41780
	JSYS830	4	49.67	12.42	40256
ALL JOBS	OTHERS	17	33.88	1.99	114291
	OTHERS	222	1040.00	6.49	1366608

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NEWS

Volume of micro-mainframe links raising MIS demands



CW AT
INFO/CENTRAL

By Maura McEnaney
CW Staff

CHICAGO — Managers must be prepared for the increased volume of transactions created by the proliferation of micro-mainframe links, said analysts and vendors at a conference here recently.

"We have only seen the beginning" of micro-mainframe links, Thomas Willmott, vice-president at International Data Corp. (IDC), told a group of attendees at Info/Central:

The Information Management Exposition & Conference.

Although most personal computers in the marketplace today are operating in a stand-alone environment, that environment is quickly changing, Willmott said. A recent IDC survey found that 92% of IBM Personal Computers used in the office are stand-alone models using Lotus Development Corp. 1-2-3 spreadsheet packages, he said.

'Be careful when buying'

Maintaining data integrity is the most important micro-mainframe issue facing managers today. Willmott advised managers to "be careful when buying" software packages

and make sure security functions are included.

Data processing departments are not prepared for the volume that will surface once mainframe links are installed, Willmott said. Before buying the packages, managers should take a serious look at capacity planning, he noted, particularly because implementation of micro-mainframe links chews up much of the mainframe's resources.

Attention must also be paid to data administration — what shape the data should take with a micro-mainframe link and how that information will be transferred. "Most [companies] don't have an active data dictionary," he said.

A company's staffing needs will also increase as a result of the pending micro-mainframe explosion, according to Willmott. More end users means an increase in support and training, he explained. With more training, users can do more for your system. "A programmer can build interfaces in your shop," he said.

Micro-mainframe links draw a range of end users accessing mainframe data, including novices who query existing files and create simple transactions, intermediate users who want to build their own applications and expert users working with fourth-generation languages, said Doni Wszolek, director of marketing for Information Builders, Inc.

The selected solution must address this issue, he told the group, and management, too, must be aware of the problem. "Top management may not understand why they can access one file but not another," he said.

Security issues still unresolved

Micro-mainframe security is a latent issue, according to Wszolek, who said he believes companies should undertake a range of forecasting plans, taking security issues into consideration. "Security issues have not been resolved," Wszolek said, and will continue to be a major problem "until we hear why a company's five-year plan was blown out of the water because someone didn't take care [while using] the Lotus entry spreadsheet."

Wszolek said the variety of users also affects data security. "Novice users won't care about data security," he said. To protect data integrity best, "Security has to happen at the mainframe level, not the [personal computer] level," Wszolek said. "That at least will protect you in terms of what data comes down."

For most companies interested in the micro-mainframe issue, "1985 will be seen as the year in which the decision will be made, and '86 will be the year of implementation," Willmott said.

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The theme of the conference is "Communicating Manufacturing Technology." Aspects of integrated manufacturing will be discussed. The conference also will include exhibits by manufacturers and suppliers, and the Integrated Manufacturing Institute will offer examinations for certification as a numerical control programmer.

Registration fees for members are \$365 before April 26, \$415 after April 26; and for nonmembers the fees are \$415 before April 26, \$465 after April 26.

For more information, the Association for Integrated Manufacturing Technology is at Suite 600, 111 E. Wacker Drive, Chicago, Ill. 60601.

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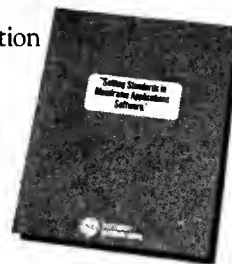
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DASD from page 1

to the 3880 disk control unit to the evolutionary 3480 cartridge tape unit announced by IBM last March.

IBM Dasd offerings cause concern for competition

IBM's Dasd announcements appear to have caused more concern (to both users and vendors of competing products) than some of the newly announced main-frame processors the devices were designed to support. For makers of IBM-compatible disk and tape drives, the pace has clearly accelerated in the expensive and demanding technological race with IBM. For users, uncertainty has invaded the once highly stable IBM Dasd marketplace.

The first casualty of the most recent technological race with IBM was Control Data Corp., which, after months of nagging problems with its 3380-compatible product, decided that keeping up with IBM was too much of a strain. The company opted out of the end-user, IBM-compatible Dasd business in late September [CW, Oct. 8] and decided to focus on selling its disk and tape units to the OEM market.

The well-publicized financial troubles of Storage Technology Corp. (STC), caused by the high financial drain of a failed Cmos main-frame project and development costs of a 3380-compatible disk drive, forced STC to file for protection under Chapter 11 of the Federal Bankruptcy Act in October [CW, Nov. 5]. It is still unclear whether STC will fully recover from these financial hard times, but industry observers agreed that the firm's recent cash problems have imperiled its ability to foot the high R&D costs necessary to compete with IBM.

One thing appears certain to industry watchers: If STC fails, Fujitsu Ltd. and Hitachi Ltd. will wind up struggling to compete to sell additional products to STC's installed base. Some analysts believe that the two firms will also compete to take over the service of STC products if that company fails.

Some view Memorex Corp. as a weakening contestant in the IBM-compatible race. International Data Corp., a market research firm based in Framingham, Mass., maintains that Memorex has managed to keep peripheral sales to its parent company Burroughs Corp. fairly constant, while sales to the IBM main-frame community have dipped significantly. Other industry analysts, such as James Porter, president of Disk/Trend, Inc. in Los Altos, Calif., believe that Memorex still has the opportunity to rebound in the IBM-compatible disk and tape business. Porter, however, maintains that much depends on Burroughs' willingness to keep short-term pressure off Memorex to produce financially.

While it must be noted that Memorex and STC still

have an opportunity to turn around what analysts view as slumping sales, many see the two developing front-runners in the IBM-compatible Dasd marketplace to be Amdahl Corp. and National Advanced Systems Corp. (NAS). Each company has strong backing from Japan: Fujitsu owns half of Amdahl and Hitachi supplies NAS with its hardware for sale in the U.S. This gives the two firms an open line to peripherals developed in Japan to compete with IBM products, noted Ray Freeman Jr., president of Freeman Associates, Inc., a management consulting firm in Santa Barbara, Calif.

The uncertainty that currently surrounds some IBM-compatible disk and tape drive manufacturers appears to have caused some users to shy away from buying non-IBM gear altogether.

"Right now I wouldn't touch one [IBM-compatible Dasd] with a 10-ft pole. This shop is not going to do anything with compatibles," noted Andrew F. Haiduck, DP manager for Spartan Stores, Inc. in Grand Rapids, Mich.

Haiduck explained he is more concerned about maintaining top-notch service and support for his IBM 3083 Model JX and 4341 Model Group 12 processors and channel-attached peripherals than he is about reaping the benefits of a better price/performance ratio. Haiduck explained he is more concerned about maintaining top-notch

information services with John Hancock Mutual Life Insurance Co. in Boston. Colby noted that while his firm has used and has been pleased with STC disk and tape drives, STC's future appears to be too uncertain at this time to justify additional purchases.

Willing to buy certain non-IBM products

Both Colby and Haiduck agreed that their bias toward buying solely from IBM applies only to processors and the large peripherals that attach directly to them. Both admitted they often select non-IBM products when buying less strategic peripherals such as printers, plotters and terminals.

"It looks to me as if IBM's got the market just where they want it," Colby said, noting that IBM's recent dual-capacity 3380 appears to widen further the gap between IBM and competing products.

"There has been a chilling effect with regard to users' openness to go with [plug-compatible manufacturers]," admitted Frank Gens, an industry analyst with the Yankee Group, a market research firm in Boston. But Gens contended that the coolness may be a passing phase brought on by IBM's recent onslaught of product announcements.

Gens believes users will gradually regain confidence in IBM-compatible disk and tape drives as the marketplace stabilizes.

IBM 3480 drive promises to stave off competition

By Tom Henkel
CW Staff

After nearly five years of rumors, IBM unveiled the successor to its staid 3420 tape drive — the 3480 — last March [CW, March 26]. Released to non-beta-site IBM users just a few months ago, the 3480 is another strategic IBM product that promises to keep the competition at bay for months.

In the 10 months since its announcement, IBM has kept one vital part of the unit, the tape cartridge, out of the hands of the competition. Consequently, a year after its announcement, none of IBM's competitors have been able to announce a 3480-compatible tape drive. Since the official IBM tape cartridge unit did not appear on the market until last February, industry watchers said they believe it will be at least another six to eight months before any IBM-compatible vendor will be able to deliver a competing product. IBM-compatible makers have hinted that they are planning a 3480-compatible product.

Delays in developing a 3480-compatible tape drive may not leave the competition as far behind IBM as competitors are in delivering 3380-like disk drives. Although the 3480 is clearly an evolutionary product for both IBM and IBM mainframe users, industry watchers agreed that the initial demand for the unit will be somewhat softer than that for the 3380, which provided an immediate and dramatic improvement in storage capacity and floor space requirements over its 3350 disk drive predecessor.

The reason for the predicted slower initial demand for the 3480 is that the unit's cartridge tape is not directly compatible with the reel-to-reel format used on the older 3420 and compatible units. For users who have spent the past 10 years storing archival data on 10½-in.

See TAPE page 26

TAPE DRIVES — IBM 3420 AND COMPATIBLES

Vendor	IBM White Plains, N.Y.	National Advanced Systems Corp. Mountain View, Calif.	Memorex Corp. Santa Clara, Calif.	Storage Technology Corp. Louisville, Colo.	Storage Technology Corp. Louisville, Colo.	Storage Technology Corp. Louisville, Colo.
Model	IBM 3420-8	7420-88	3228, 3281	3630, 3650, 3670	3430, 3440, 3450, 3470	4670
Recording Characteristics (bit/in)	6,250	1,660 or 6,250	6,250	1,600 or 6,250	800 to 1,600	1,000 to 6,250
Controller Used	IBM 3803	NAS 7803-21	Memorex 3221 or 3222	STC 3800-4	STC 3800-3	Internal
Transfer Rate (bit/sec)	1.25M	320K (1,660 BPI) 1.25M (6,250 BPI)	1.25M	320K to 1,250K	80K to 312K	320K to 1,250K
Rewind Time (2,400 ft)	45 sec	Not available	45 sec	50 sec	50 sec	50 sec
Tape Type	Reel-to-reel	Reel-to-reel	Reel-to-reel	Reel-to-reel	Reel-to-reel	Reel-to-reel
Purchase Price	\$19,880	\$19,250	\$19,880 (3228) \$73,000 (3281)	\$16,600 (3630) \$19,100 (3650) \$21,000 (3670)	\$14,520 (3430) \$17,710 (3440) \$18,490 (3450) \$20,380 (3470)	\$46,800 (Model A) \$20,850 (Model B)
Availability	4 months	Very limited		30 days	30 days	30 days

1. For a control unit plus one tape drive.

IBM 3480 TAPE DRIVE

Vendor	IBM White Plains, N.Y.
Model	3480 Models A, B
Recording Characteristics (bit/sec)	38K
Controller Used	Internal
Rewind Time (2,400 ft)	48 sec
Tape Type	Cartridge
Purchase Price	\$65,430 (Model A controller) \$43,120 (Model B tape unit)
Availability	Not available

Thriving IBM 3380s paint grim picture for competition

By Tom Henkel
CW Staff

In March 1981, IBM admitted it had made an embarrassing mistake. Deliveries of its innovative 2.5G-byte 3380 disk drive, announced several months earlier, were being suspended indefinitely because of problems in the unit's head disk assembly. Six months later, things got worse. IBM said it had fixed the problems with the 3380, but that deliveries of the units would be 14 months late.

The delay caused a near panic among memory-hungry users. Complacent that they would soon be receiving 2.5G-byte disk drives from

IBM, many IBM mainframe users found themselves thrust into a crisis — they had to find a short-term memory alternative to wait out IBM's 3380 delay.

The best bet was the older 3350. Even though it took four 3350s to equal one 3380, users ordered 3350s in droves. It got to the point where IBM, which industry analysts said had already ramped down 3350 production in lieu of the 3380, sent out a plea to its users to defer 3350 deliveries if possible.

— Computerworld, Oct. 5, 1981

Although 1981 was a year IBM

would probably rather forget, a look at the IBM mainframe disk drive marketplace four years later shows that Big Blue bears few scars from its early 3380 problems. If anything, IBM appears to have emerged from one of its lowest moments in perhaps its strongest position ever in the mass-storage market.

According to the Framingham, Mass., market research firm, International Data Corp. (IDC), IBM swamped the competition in the 500M-byte and larger disk drive marketplace in 1984. In the 3380 market alone, IDC said IBM sold nearly six times as many 3380 spin-

dles in 1984 as did all of its competitors combined. In 1983, IBM did an even more lopsided business, selling nearly 35 times as many 3380 spindles as all of its competitors. Furthermore, in the 500M-byte and larger disk drive category, IDC contended that IBM holds a 70% share of the market — not just among IBM and compatibles but among all vendors.

What has happened since the IBM 3380 delay typifies the profound force IBM has wielded over its competitors. IBM gave the competition a rare gift of 14 extra months to develop a 3380-compatible product, but

See 3380 page 27



DISK DRIVES — IBM 3370 AND COMPATIBLES

Vendor	IBM White Plains, N.Y.	IBM White Plains, N.Y.	Memorex Corp. Santa Clara, Calif.	Memorex Corp. Santa Clara, Calif.
Model	3370	3375	3690	3695
Capacity (In bytes)	729.8M	819.7M	729.8M	819M
Price	\$35,480 (Model A) \$26,600 (Model B)	\$38,040 (Model A) \$28,770 (Model B)	\$35,480 (Model 3693) \$26,600 (Model 3690)	\$38,040 (Model 3697) \$28,770 (Model 3695)
Technology Used	Thin film read/write heads	Thin film read/write heads	Thin film read/write heads	Ferrite read/write heads
Controller Required	IBM 3880	IBM 3880	Memorex 8880-3 IBM 3880-3	Memorex 8880-3 IBM 3880-3
Controller Price	\$60,270	\$60,270	\$60,270 (8880) \$60,270 (3880)	\$60,270 (8880) \$60,270 (3880)
Average Access Time (In msec)	20	19	20	19
Dual Porting?	No	No	Yes	Yes

DISK DRIVES — IBM 3350 AND COMPATIBLES

Vendor	IBM White Plains, N.Y.	National Advanced Systems Corp. Mountain View, Calif.	Storage Technology Corp. Louisville, Colo.	Amdahl Corp. Sunnyvale, Calif.
Model	3350	7306 (dual-density)	8650	6280
Capacity (In bytes)	635M	2.4G	2.4G	1.2G
Price	\$32,030 (Model A) \$25,360 (Model B)	\$54,000 (Model A4) \$39,000 (Model B4)	\$46,875 (Model A2) \$39,540 (Model B2)	\$49,200 (Model AA4) \$35,800 (Model B4)
Technology Used	Ferrite read/write heads, particulate media	Ferrite read/write heads, particulate media	Ferrite read/write heads, oxide media	Ferrite read/write heads, particulate media
Controller Required	IBM 3880	NAS 7880	STC 8880-2 STC 8890	Amdahl 6880
Controller Price	\$60,270 (Model 3)	\$48,150 (Model 3) \$129,600 (Model 13)	\$59,020 (8880) \$108,900 (8890)	\$134,480 ²
Average Access Time (In msec)	25	25	25	18
Dual Porting?	No	Yes	Yes	Yes

1. Available in limited quantities.
2. For an eight-channel switch controller.

DISK DRIVES — IBM 3380 AND COMPATIBLES

Vendor	IBM White Plains, N.Y.	IBM White Plains, N.Y.	National Advanced Systems, Corp. (NAS) Mountain View, Calif.	Storage Technology Corp. (STC) Louisville, Colo.	Memorex Corp. Santa Clara, Calif.	Amdahl Corp. Sunnyvale, Calif.
Model	3380	3380 Extended Capability Models	7380	8380	3680	6380
Capacity (In bytes)	2.5G	2.5G to 5.04G	2.5G	2.5G	2.5G	2.5G
Price	\$88,780 (Model A) \$64,440 (Model B)	\$88,780 (Single capacity Model AD4) \$64,440 (Single-capacity Model BD4) \$134,740 (Dual-capacity Model AE4) \$110,400 (Dual-capacity Model BE4)	\$85,500 (Model A4) \$58,500 (Model B4)	\$76,130 (Model A4) \$87,225 (Model AA4) \$63,150 (Model B4)	\$88,780 \$64,440	\$71,200 (Model AA4) \$49,700 (Model B4) \$38,950 (Model M4)
Technology Used	Thin film read/write heads, oxide media	Thin film read/write heads, oxide media	Ferrite read/write heads, particulate media	Thin film read/write heads, oxide media	Thin film read/write heads, particulate media	Ferrite read/write heads, particulate media
Controller Required	IBM 3880	IBM 3880	NAS 7880	STC 8880 Model 2; STC 8890	IBM 3888 Model 3	Amdahl 6680
Controller Price	\$349,975 (Model H21) \$429,975 (Model J21) \$ 60,270 (Model 3)	\$349,875 (Model H21) \$429,975 (Model J21)	\$129,600 (Model 13) ¹ \$48,150 (Model 3)	\$108,900 \$59,020	\$60,270	\$134,480 ²
Average Access Time (In msec)	16	15 (single-capacity) 17 (double-capacity)	16	16	16	15
Dual Porting?	No	Yes	Yes	Yes	Yes	Yes

1. Includes 4M bytes of cache memory.
2. For an eight-channel switch controller.
3. For a Memorex 3683 head-of-string control unit and two 3680 disk drives with 1.25G bytes of storage.
4. For two 3680 disk drives with 1.25G bytes of storage.

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NEWS

TAPE from page 24

reels, the 3480 does not offer the simple solution of bringing in a new box that offers better performance.

Many companies have amassed warehouses full of 10½-in. tape reels. For them, total conversion to the 3480 cartridge format is flatly impossible. Analysts said they believe that most large mainframe shops will ease in the 3480 over a period of years, starting with one specific application and gradually expanding.

Market for 3420 remains

The expected paced migration to 3480s also means that the market for older 3420 disk drives will not dry up overnight.

James Porter, president of Disk/

Trend, Inc. in Los Altos, Calif., noted that the demand for new 3350 disk drives virtually vanished after IBM got its 3380 production into full swing because there were plenty of used 3350s on the market at agreeable prices.

Consequently, although IBM and most of its competitors said they still offer a 3350-type unit, Porter contended that none are actually still manufacturing the device.

Porter maintained that the market for 3420s will not show as dramatic a drop-off. But he admitted that as more used 3420s appear on the market, there will be a continuing decline in demand for new 3420-type devices.

IBM's 3480 offers some dramatic improvements over the 3420. The unit can transfer data at IBM mainframe channel speeds of 3M byte/sec and can store up to 200M bytes on ½-in., chromium dioxide, 18-track tape. The unit has a recording density of 38K bit/in.

The 3420 can store 160M bytes of data on ½-in. iron oxide 9-track tape and can only transfer data at IBM's

”

To back up a 1.2G-byte 3380 spindle requires an operator to change the 3480's 200M-byte tape cartridges six times.

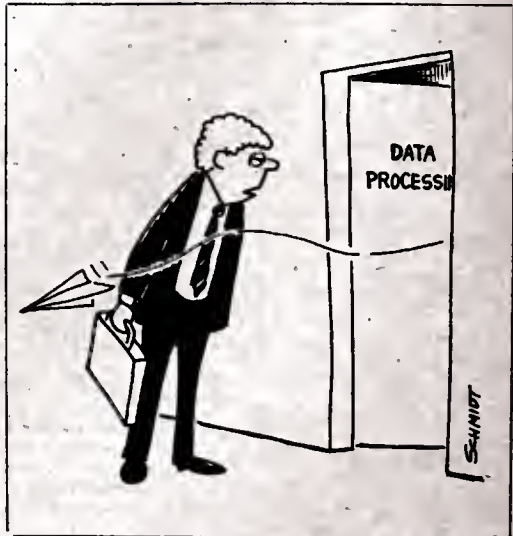
old channel speed of 1.25M byte/sec. It has a recording density of 6.25K bit/in.

Disadvantages to the 3480

There are also some disadvantages to the 3480. International Data Corp., a Framingham, Mass., research firm, noted in a recent report that what IBM terms "full function support" mode of the 3480 is only available under IBM's MVS/SP and MVS/XA operating systems.

Furthermore, in its current state, the 3480 requires significant operator intervention. For example, to back up a 1.2G-byte 3380 spindle requires an operator to change the 200M-byte tape cartridges six times. That means it requires 12 cartridges to back up one 3380 and 24 cartridges to back up IBM's new double-capacity 3380 model.

Industry watchers said they believe IBM will soon unveil an automatic loading feature for the 3480 to handle this problem.



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NEWS

3380 from page 25

none were able to do so. Carol Lerner, a researcher at IDC, explained that although IBM managed to get the 3380 back on the market by early 1982, Hitachi Ltd., which sells its products domestically through National Advanced Systems Corp., was the first IBM-compatible vendor to have its disk subsystem on the market. Hitachi put its 7380 on the market in late 1982, nearly a year after IBM began volume shipments. The other competitors, Fujitsu Ltd. (domestically Amdahl Corp.), Storage Technology Corp. (STC) and Memorex Corp., did not start making significant shipments of their products until 1983.

Control Data Corp., which was plagued by problems with its 3380 compatible, bailed out of the end-user, IBM-compatible business after delivering only a handful of 3380-type drives.

"The competition shot itself in the foot," noted James Porter, president of Disk/Trend, Inc. Porter maintained that IBM achieved its current

shipped 60,000 3380 spindles vs. 4,000 from STC, 3,000 from Hitachi, 2,000 from Fujitsu, 1,500 from Memorex and 700 from CDC.

On the extra features front, Disk/Trend's Porter said that the technical complexity of devices like the 3380 and 3480 make it increasingly difficult for competitors to add special features not already offered by IBM.

Consequently, vendors of IBM-compatible hardware may have to settle on significantly underselling IBM in efforts to attract IBM mainframe users. Unfortunately, Porter noted, that tactic means the competition must also settle for smaller profits on units sold.

A case in point is Amdahl. The company cut the price of its 6380 disk subsystems by roughly 12% in

September [CW, Sept. 10]. A 6380 subsystem — including 6880 disk controller — that sold for \$148,030 last March, was cut to \$130,170. In late February [CW, Feb. 25], Amdahl lowered its 6380 prices again, unveiling a 6380 Model M4, which functions the same as the firm's Model B4 but costs about 20% less. The M4 can

be used as the third and fourth drives on a 6380 string consisting of a Model AA4 and B4. Although the future for makers of IBM-compatible disk drives currently appears somewhat grim, one cannot

overlook the possibility that IBM's heavy advantage may be a temporary situation brought on by the switch to the new, complex thin-film, read/write head technology used in the 3380.

Most industry analysts agree that

the days of a free ride for makers of IBM-compatible equipment are over, because any attempt to significantly improve 3380-like products represents a monumental physics problem and a high R&D investment.

Frank Gens, an analyst with the Boston-based Yankee Group, said the physical barriers to improving the 3380-type disk drive may lead to a period of stability, which could give the makers of compatible products an opportunity to recover from IBM's recent fast-paced product upgrades.

Furthermore, Gens said, most IBM mainframe users are not as interested in the technology used inside a disk subsystem as they are in its performance and floor space requirements. Consequently, Gens said he sees brighter days ahead for the survivors of the current cool period of interest in IBM-compatible products.



”

The days of a free ride for makers of IBM-compatible equipment are over, because any attempt to improve 3380-like products represents a monumental physics problem.

position of dominance not because it has been using its massive size and financial resources to kill off the competition, but because the competition has been unable to keep up.

A classic example, Porter said, is STC, a company that had been IBM's toughest competitor in the mainframe-compatible disk and tape drive business and that is now struggling for its life.

"IBM got lucky on this one," Porter said, noting that STC's attempt to enter the IBM-compatible mainframe business, followed by technical problems with its 3380-compatible product, drained its resources and taxed its ability to compete with IBM.

But underlying specific vendors' problems, Porter said, is a broader problem of diminishing advantages of IBM-compatible products.

Porter explained that, traditionally, three factors have drawn users to IBM-compatible peripherals: a better price, an earlier delivery date or special features that IBM does not offer. Porter contended that IBM's newest high-end peripherals, the 3380 disk drive and 3480 tape unit, appear to limit the ability of competing vendors to take advantage of at least two of those selling features — early delivery and special features.

With the 3380, IBM has jumped to an early lead in delivering more units than the competition did. IDC figures say that in 1983, IBM shipped 29,200 3380 spindles, compared with 400 from Memorex, 300 from Hitachi, 100 from Fujitsu and 35 from STC. For 1984, IDC estimated a similar lopsided advantage for IBM. The market research firm estimated that IBM

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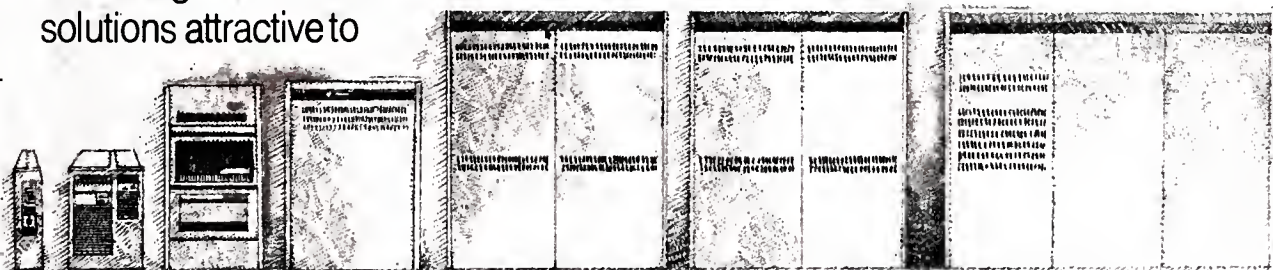
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Insurance firm automates system one step at a time



**CW AT
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By Maura McEnaney
CW Staff

CHICAGO — For Metropolitan Life Insurance Co., automating its group insurance administration area is a six-year job. According to Metropolitan's John Zeitler, assistant vice-president for administrative planning and policies, it has meant phasing out a system that originated

in the 1960s and creating and installing application programs that would, among other things, automate customer lists, bill collection and premium processing.

Batch processing, magnetic tape and card input were headed out the door; a data base management system (DBMS) and information center to support the program were on their way in.

Zeitler described the new system, called Metropolitan's Financial and Administrative Customer Services System (Metfacs), at Info/Central: The Information Management Exposition & Conference here recently.

Last November, Zeitler said, Metropolitan implemented the first of the Metfacs application packages, known as Metfacs Administration. Two other application projects are in the development stage — a premium accounting project will be installed in 1986, and a claims accounting package will be established in 1987, he said.

Prior to the implementation of Metfacs, the availability of information at Metropolitan was very limited, Zeitler said. "This started to perpetuate itself," he said, adding that this created poor communications with sales offices and a lack of confidence in the company. The objective of the Metfacs system, Zeitler explained, was to tie together information processing at 40 sales offices in four zones around the country.

Selecting the DBMS was not an issue for Metropolitan, Zeitler said, because the company already used Culinet Software, Inc.'s IDMS in several locations.

Senior management involvement

The first step in the project, he said, was the formation of a conceptual design team. Composed of representatives from several areas of the company, the team was responsible for identifying data relationships, Zeitler said, which involved "looking beyond the operations and organizational boundaries." More important than the design team, however, was senior management involvement, he noted.

"We sold our senior management on the need for the system," Zeitler said. Metropolitan management was aware of a general lack of confidence throughout the company and of the potential for savings through automating several processes. Representatives from various business groups throughout the company were also involved in the planning. "Steps were taken to get them involved and keep them interested," he said.

The conceptual design team consisted of one senior staff member, two managers, a corporate planner and two DP representatives. Each person was critical to the project, Zeitler said. "If we did not get the business people, I think we would have stopped."

To identify data entities and relationships for that data, more than 100 workers were interviewed. From those interviews, the group identified 88 data entities and 112 relationships for that data, paring down the list from 270 identities and 300 relationships, Zeitler said.

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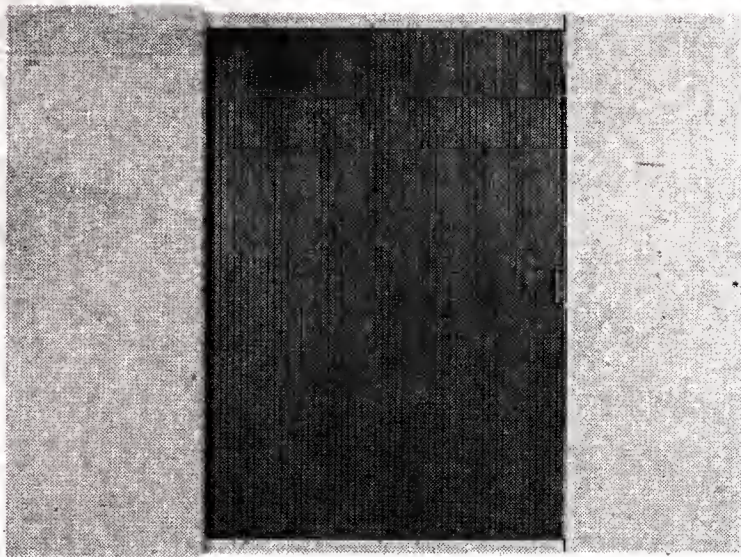
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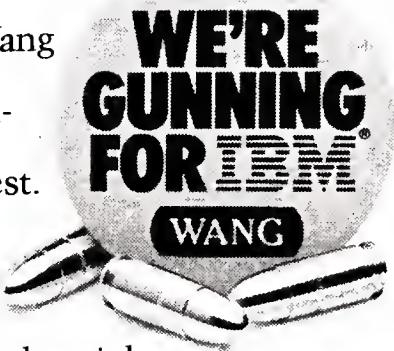
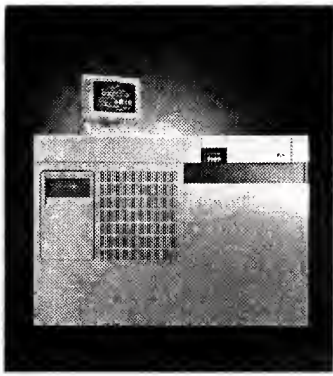
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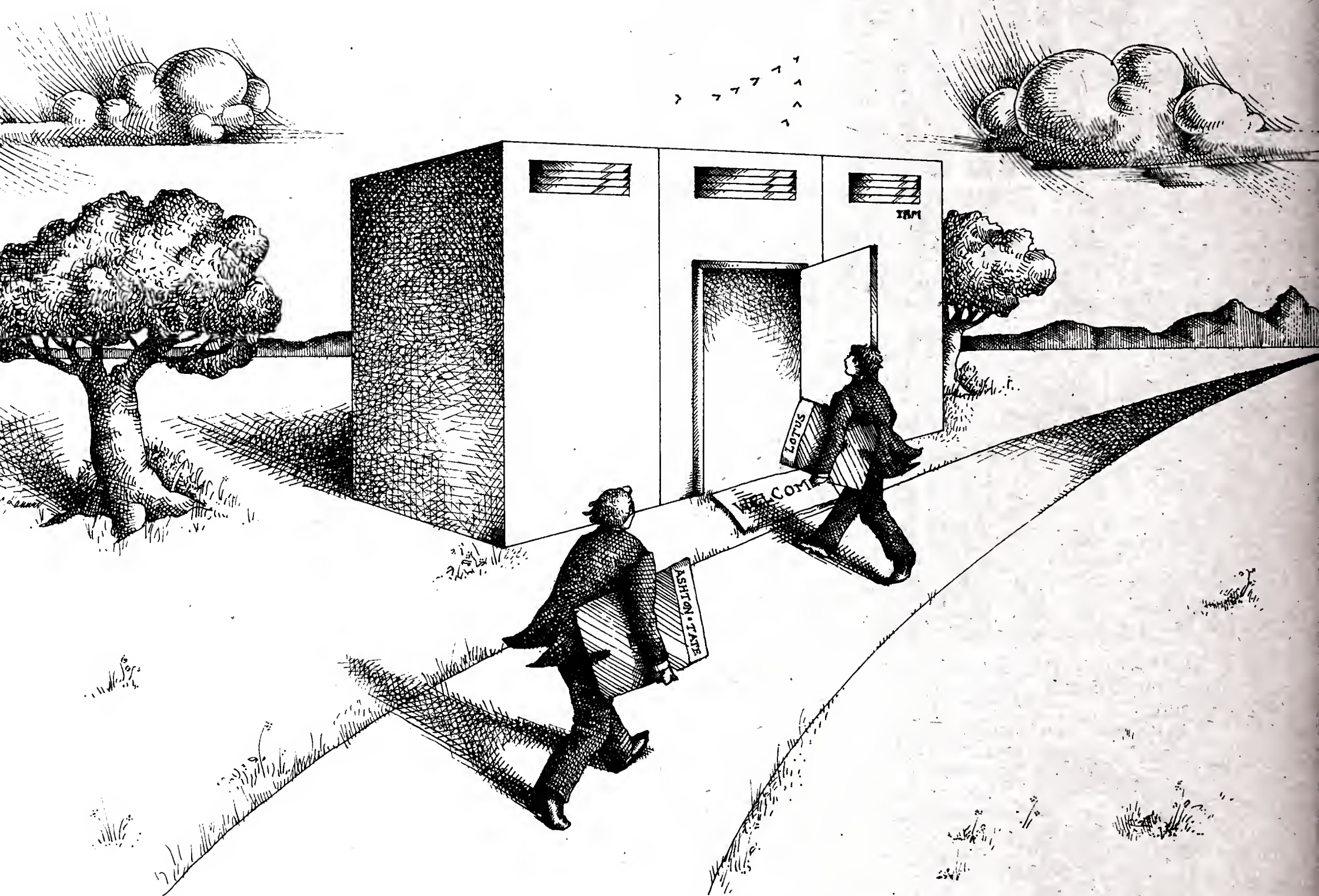
Or write to the Wang Business Executive Center, One Industrial Avenue, M/S 5413, Lowell, MA 01851.



WANG

FEATURES	WANG VS 85	IBM SYSTEM 36
Migration without conversion up to 192 users	Yes	No
32-bit Architecture	Yes	No
Cache	Yes	No
Object Code Compatibility	VS 15, 25, 45, 65, 85, 100, 300	36 only
Virtual Memory Operating System	Yes	No
Removable Storage Options	Yes	No
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NEWS

New York library gets computers

By Donna Raimondi
CW Staff

NEW YORK — Patrons of the venerable New York Public Library here will soon shift from chaos to order in their search for materials in Public Catalog Room 315. The room was shut down in January — for the first time since its opening in 1911 — for conversion from an obsolete cataloging method to a contemporary bibliographic and computerized catalog system.

When the room reopens in the fall, more than one million records that were located in at least four different places will be available to users on a computerized system, said Rodney Phillips, chief of the library's general research division.

"The technology will not jump out at you," Phillips said. The room's basic architecture will be the same but the dilapidated card catalog boxes, of which there are more than eight thousand, will be gone and new shelves for books and terminals will be in place.

If a researcher wants to look up six writers on one subject using the new system, Phillips said, he will merely type FIND, the subject and the writers' names, all strung together. In five seconds, the researcher could have 79 items to choose from. Previously, researchers would have had to look in 18 different places for the six writers and would have had to know their exact names or the exact titles of wanted books, he added.

Volumes from the time the library opened to 1971 were catalogued in card form in drawers that were falling apart from age and use, Phillips said. From A to E of the old card catalog has been photographed, micro-filmed and made into books, he said. When the room reopens, all the old volumes, from A to Z, will be in book form placed along one wall. Volumes since 1972 have been cataloged in book form and archived on machine-readable tapes. The archive tapes of those records are being reprocessed by Carlyle Systems, Inc. of Berkeley, Calif., to run on Carlyle's On-Line Multiuser System, Phillips said.

The parallel processing system that Carlyle designed for the library is composed of a remote processor to handle terminals and validate user inquiries, a data base processor that works around the variable length records of the library's Machine Readable Catalog system and an interface processor that acts as a traffic cop between the remote processor and the data base processor. The three processors are built around Intel Corp. 80286 chips.

Thirty-five to 50 terminals will be in place when the room opens again, Phillips said, and eventually there will be approximately 100 terminals in the library. Patrons already have access to four terminals, he said, and they want more. "They want the old catalog in there. . . ." he said. At this point, 3½ years of titles are on-line, and by December, 1.8 million records should be computerized, Phillips added.

DP salaries up 5.9%, study reports

NEW YORK — Salaries for programmers and data base administrators will be among the fastest growing wages for data processing personnel in 1985, according to a study released earlier this year by Robert Half International, Inc., a DP and financial executive recruiting company.

The annual study — based on analyses of position requests that employers have submitted to Robert Half offices — covers the major data processing categories and is broken down into large, medium and small companies.

Overall salary increases across all DP professions averaged 5.9% over salaries paid in 1984, according to

the study.

Programmers in large installations showed a 9.1% increase over 1984 salaries, according to the study, while programmers in medium installations reflected a 7.1% increase. Salaries for programmers in small shops increased by 8.3%.

The study showed that salaries for data base administrators, a category not applicable in small installations, increased by more than 9% in large as well as medium installations.

Starting wages in Alaska and Hawaii were 18% and 15% higher than the national average, respectively, the survey revealed. Starting DP salaries in California, Nevada and Connecticut were 5% higher than the na-

tional average, while in Maine, New Mexico, Florida and West Virginia, starting salaries were 9% to 10% lower.

Managers for systems and programming fared poorly in small installations, according to the study, with an average increase of 3.1%. This contrasts with a 9.5% increase for managers' salaries at large installations and a 7.9% upgrade in medium installations.

The survey booklet, which contains starting salaries for financial executives as well as for data processing personnel — may be obtained free of charge from Robert Half International, 522 Fifth Ave., New York, N.Y. 10036.

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NEWS

On-line courses help users access subscription service

WESTWOOD, Mass. — The Faxon Co., a magazine subscription provider serving 25,000 corporate and university libraries in 92 nations, is developing on-line courses for its employees and customers by using software for authoring computer-based instruction.

Faxon customers use the on-line courses to learn how to access Faxon's Linx remote subscription management service. Using Linx, customers can access lists of their magazine holdings and the facility's records. The Linx Datalinx option can be used to place orders for any of 115,000 available magazines or to send messages to Faxon management.

Approximately 50 on-line tutorials have been developed using the software, Scholar/Teach 3 from Boeing Computer Services Co. All are available on the same terminals customers

use to connect to Linx.

"People need to know how to access the system, update their files and retrieve information," said Dennis Corcoran, Faxon's supervisor of education and training.

"Our own people are always adding, changing and maintaining data. We have created an on-line training system [that] is menu-driven and very easy to use. Every new employee spends a week with us, and they go through their departmental training on [computer-based instruction]," Corcoran said.

In all, Faxon has developed 117 on-line courses using the software, which runs on an IBM 3081K mainframe. Other courses are used for in-house training and are accessed by employees using IBM 3270 terminals.

Corcoran said Faxon selected Scholar/Teach 3 for its easy authoring capability. According to Corcoran, "Faxon evaluated the available [computer-based instruction] software and concluded that Scholar/Teach 3 was best suited to meet its needs."

"One of the big competitor's training systems is very hard to use, very difficult to program. You really need a programmer to make it work, and sometimes even programmers have difficulty," he said. "Other [computer-based instruction] software is oversimplified. They bring you through menus all the time. Menus are nice in the first few weeks of use, but you get tired of them very quickly."

Faxon sells its services by system, so the training for a given application begins with a main menu citing the systems available. After the user selects the desired system, a sub-menu lists the courses associated with that specific application. Courses run from 20 to 30 minutes.

Nancy Robison, an assistant training specialist at Faxon who had no prior DP experience and has now written several of the computer-based instruction courses, said, "Scholar/Teach 3 software made it easy for someone without programming experience to convey that knowledge in the form of a [computer-based instruction] course."

Dema seminar set for March

CAMBRIDGE, Mass. — The Data Entry Management Association (Dema) will host a seminar March 11-12 at the Hyatt Regency Hotel here.

Topics will include management's failure to provide a proper working environment for its data entry staff, how managers can improve their skills and stress management. The seminar will also be offered in Dearborn, Mich., April 30 to May 1.

The price of admission is \$525 for members of Dema and \$575 for nonmembers. The nonmember price includes membership for one year.

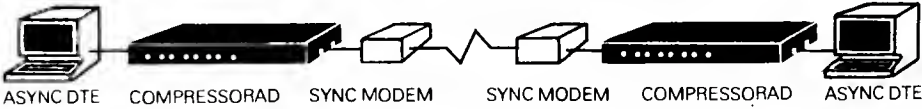
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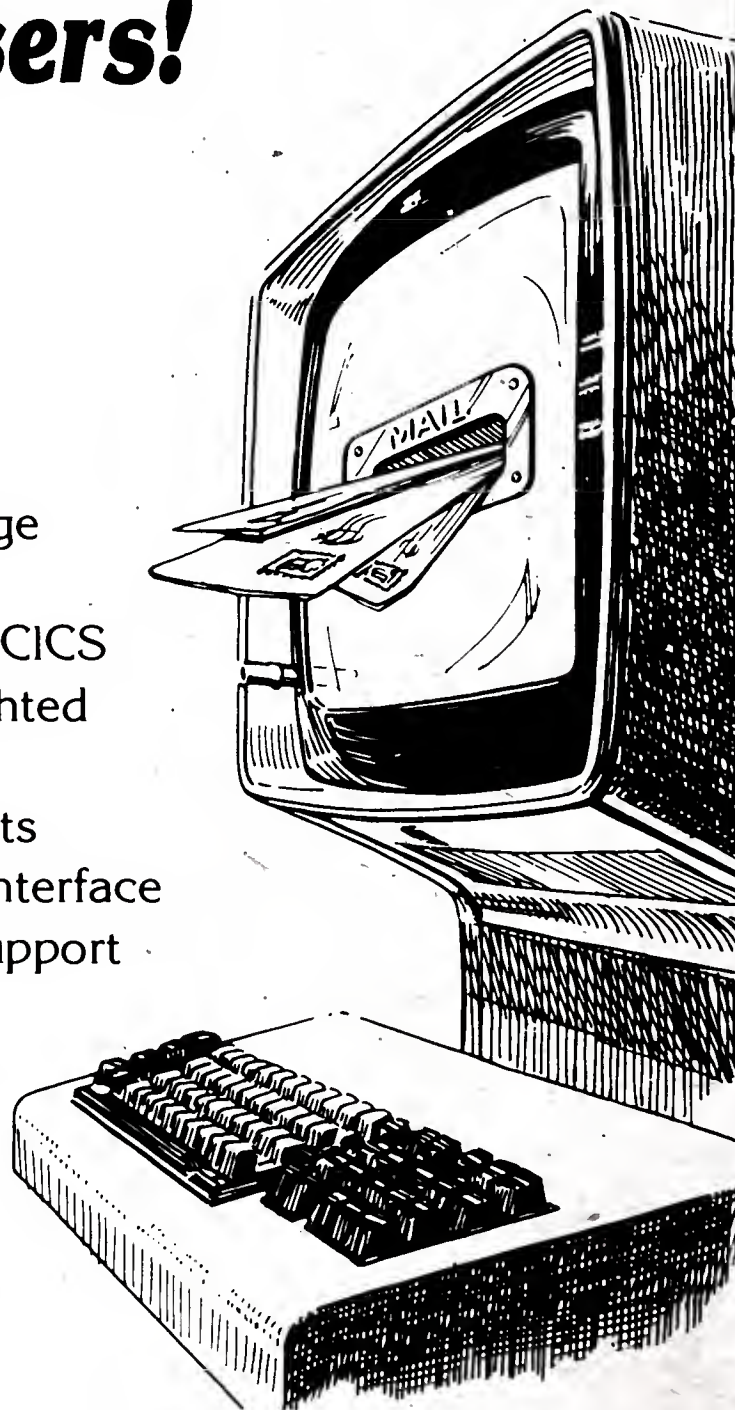
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NEWS

RCA managers extract data with common access product

CHERRY HILL, N.J. — When managers at RCA Corp.'s Information Systems and Services division were unable to attain access to data located in the corporate data base, the communications conglomerate was stuck in a productivity bind.

"We had many pieces of information that weren't being shared," said Len Hirschfield, manager of information systems. "This created confusion and wasted a lot of time. In some cases, people were even getting bad data — information that was out of date or incomplete."

RCA uses an IBM 3081 Model K and IBM's Professional Office System (Profs), which provides office automation functions to users of IBM's VM operating system. Programming languages used include Information Builders, Inc.'s Focus; Mathematica

the product as a front end to Profs only, Hirschfield said. He said he expects another 40 managers to go on-line by the end of 1985. "Fourth-generation products didn't give our managers a standard, easy way of getting information," he said. "Gateway does."

A Gateway capability used by RCA's managers is its custom reports for designing graphics packages. The company also plans to use Gateway's customizing capabilities to broadcast updated company information such as organization charts and phone directories.

”

'Fourth-generation products didn't give our managers a standard, easy way of getting information. Gateway does.'

— Len Hirschfield
RCA Corp.

Products Group, Inc.'s Ramis II; Issco, Inc.'s Tell-A-Graf; and SAS Institute, Inc.'s SAS/Graph. However, Hirschfield said, often the complexity of the languages can discourage managers, who are often computer novices, from turning to the system for information.

"The person looking for information would often start by making a phone call. The person who owned the data would then run a special report or send a copy of a file already on hand. "Sometimes you had to go through three or four levels of people before you got the information — information that could have been made available directly to the user because it was on-line somewhere," Hirschfield explained.

Hirschfield began looking for a solution to solve his integration problems. "We were looking for a way to bring all the pieces together in one common access method, one common set of instructions," he said.

SCA Product and Services, Inc.'s Gateway was one of the products on the market that was able to meet his needs, Hirschfield said. The product was designed to provide an integrated environment for the Information Center, combining fourth-generation products for reporting, graphics and financial modeling. It can also provide an interface to the languages used at RCA.

Hirschfield said he selected the product because it shields the user from the complexities of the programming languages and makes information available through menus, screens and prompts.

Since Gateway was introduced at RCA, 50 high-level managers and professionals have been introduced to the system, with 40 others using

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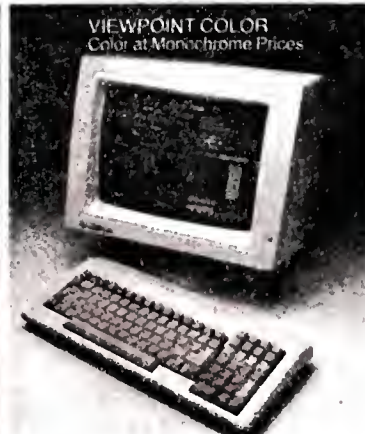
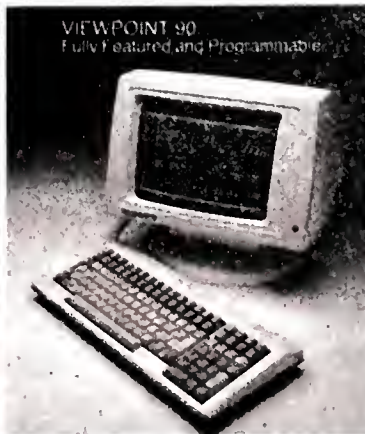


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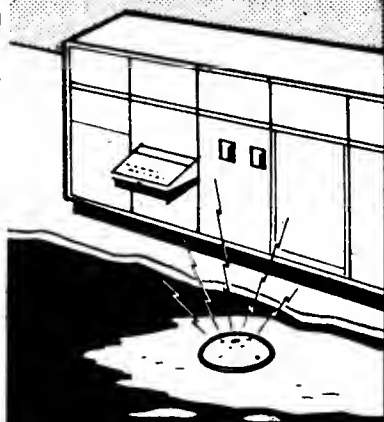
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NEWS



INTERNATIONAL REPORT

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ENGLAND

LONDON — The British Post Office is looking for IBM experts to go along with its planned purchase of several IBM mainframes, sources said. The post office has not updated its equipment since its split with British Telecom three years ago, a spokesman said. To update operations, the post office will replace equipment from Burroughs Corp., NCR Corp. and ICL Co.

LONDON — The U.S. government

is requiring Inmos Ltd., the UK's flagship semiconductor maker, to get government permission to transfer to Britain its own technology developed at its Colorado design center. The British Parliament is reportedly not pleased with the U.S.' control.

CAMBRIDGE — Acorn, the financially troubled British microcomputer maker, has been rescued by Olivetti Corp., which scooped up the majority of the UK company for \$10.4 million. The company's remaining stock is now valued at \$21 million, compared with a high of \$135 million just eight months ago. Acorn produces the microcomputers commissioned by the British Broadcasting Corp. for a series of television programs intended to boost national computer literacy.

FRANCE

PARIS — Six European manufacturers — Bull, ICL, Siemens AG, Nixdorf AG, Olivetti Corp. and Philips, Inc. — have joined together to develop a standard, portable European AT&T Unix operating system. The group is reportedly holding detailed discussions with AT&T and other major Unix vendors, including Microsoft Corp. as well as user organizations, to ensure product consistency and active cooperation.

The group plans to establish a common software applications environment based on Unix and will publish its definition of Unix in phases throughout 1985, a spokesman said. The resulting software will not be proprietary and will be made available to all vendors.

JAPAN

TOKYO — Hitachi Ltd. has unveiled two 3½-in. hard disk drives and a 5-in. hard disk drive. The 3½-in. drives, called the DK 301 series, are available in two versions with memory capacities ranging from 12.7M bytes to 19.1M bytes. They are priced at \$720 and \$880, respectively. The 5-in. DK 505 series is said to have two times the capacity of the existing Hitachi 5-in. model and costs \$1,120, according to the vendor.

TOKYO — Fujitsu Ltd. has enhanced its M-342 mainframe series with the addition of M-340U, which reportedly features 1.71 millions of instructions per second and 1.3 times the functionality of the existing M-340 system. The system is slated for delivery in September. Fujitsu also announced enhancements to its low-end Model R system and to its OS IVB/XB FSP operating system for mid-range machines.

SWEDEN

STOCKHOLM — The National Swedish Telephone Agency claimed to have set a world record when it recently transmitted information over normal telegraph wire composed of coaxial and optical cables at speeds of 2M bit/sec. The transmission was part of an experimental project with Sweden's Volvo Flygmotor AB to sell Volvo's data-intensive computer-aided design and manufacturing services outside the company over high-speed communications lines, a spokesman said.

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NEWS



CALENDAR

WEEK OF MARCH 31

MARCH 31-APRIL 3, ATLANTA — **The International Conference and Trade Fair for Software Merchandisers, Publishers and Corporate and Institutional Users (Softcon).** Contact: Softcon, c/o Northeast Expositions, 822 Boylston St., Chestnut Hill, Mass. 02167.

MARCH 31-APRIL 4, ATLANTIC CITY — **The 1985 Microprocessor Forum.** Contact: N. R. Kornfield, Widener University School of Engineering, Chester, Pa. 19013.

APRIL 1-2, BOSTON — **Using Dbase III.** Contact: The American Institute for Professional Education, Carnegie Building, 100 Kings Road, Madison, N.J. 07940.

APRIL 1-2, STAMFORD, CONN. — **Structuring and Negotiating Hardware Contracts, Software Contracts and DP Service Contracts.** Contact: The American Institute for Professional Education, Carnegie Building, 100 Kings Road, Madison, N.J. 07940. Also being held April 8-9 in Detroit and April 22-23 in Baltimore.

APRIL 1-2, FORT LEE, N.J. — **CICS/VS Performance and Tuning.** Contact: On-Line Software International, Inc., Fort Lee Executive Park, Two Executive Drive, Fort Lee, N.J. 07024. Also being held April 8-9 in Atlanta.

APRIL 1-3, SAN DIEGO — **Lotus 1-2-3 Applications.** Contact: The American Institute for Professional Education, Carnegie Building, 100 Kings Road, Madison, N.J. 07940.

APRIL 1-3, CHICAGO — **Purchasing Management and the Computer.** Contact: American Management Associations, 135 W. 50th St., New York, N.Y. 10020.

APRIL 1-3, NEW YORK — **IMS Utilities.** Contact: Sysed, Inc., 35 W. 35th St., New York, N.Y. 10001.

APRIL 1-3, NEW YORK — **Data Analysis and Logical Design Workshop.** Contact: Elise Rabalais, Learmonth & Burchett Management Systems, Inc., Suite 405, 2800 N. Loop W., Houston, Texas 77092.

APRIL 1-3, WASHINGTON, D.C. — **Strategic Data Planning '85.** Contact: Barnett Data Systems, 19 Orchard Way N., Rockville, Md. 20854.

APRIL 1-3, WASHINGTON, D.C. — **National Conference on Using Ada: Getting Results.** Contact: Conference/Event Manager, U.S. Professional Development Institute, 1620 Elton Road, Silver Spring, Md. 20903.

APRIL 1-4, FORT LEE, N.J. — **CICS/VS Logic and Debugging.** Contact: On-Line Software International, Inc., Fort Lee Executive Park, Two Executive Drive, Fort Lee, N.J. 07024. Also being held April 1-4 in Atlanta and April 8-11 in San Francisco.

APRIL 1-4, SAN ANTONIO — **CICS/VS Applications Design.** Contact: On-Line Software International, Inc., Fort Lee Executive Park, Two Executive Drive, Fort Lee, N.J. 07024. Also being held April 8-11 in Denver.

APRIL 1-4, SAN ANTONIO — **Vtam: From Start to Finish.** Contact: On-Line Software International, Inc., Fort Lee Executive Park, Two Execu-

tive Drive, Fort Lee, N.J. 07024.

APRIL 1-4, SAN FRANCISCO — **Fifth International Conference on Decision Support Systems (DSS-85).** Contact: DSS-85, Third Floor, 290 Westminster St., Providence, R.I. 02903.

APRIL 1-4, LOS ANGELES — **IMS/DB (DL/1) Applications Programming.** Contact: On-Line Software International, Inc., Fort Lee Executive Park, Two Executive Drive, Fort Lee, N.J. 07024.

APRIL 2, ROCHESTER, N.Y. — **The 20th Annual Upper New York State Systems Seminar.** Contact: Thomas Bisacquino, Association for Systems Management, 24587 Bagley Road, Cleveland, Ohio 44138.

APRIL 2-4, LOS ANGELES — **Corporate Personal Computer Expo.** Contact: National Institute for Management Research Seminars, P.O.

Box 3727, Santa Monica, Calif. 90403.

APRIL 2-4, NEW ORLEANS — **Gulf Computer and Office Show.** Contact: Show Management, c/o Avant Garde Circle, Kenner, La. 70065.

APRIL 2-4, CHICAGO — **Fifth National Conference on DP Quality Assurance.** Contact: Conference Manger, U.S. Professional Development Institute, 1620 Elton Road, Silver Spring, Md. 20903.

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Successful Software Management. Contact: Data Processing Management Association Educational Foundation Seminars, c/o Technology Training Corp., Department SSM, P.O. Box 3608, Torrance, Calif. 90510.

WEEK OF APRIL 7

APRIL 8-10, NEW YORK — **Controlling Software Projects: Management, Measurement and Estimation.** Contact: Technology Transfer Institute, 741 10th St., Santa Monica, Calif. 90402.

APRIL 8-11, SAN ANTONIO — **IMS/DC (Data Communications) Programming.** Contact: On-Line Software International, Inc., Fort Lee Executive Park, Two Executive Drive, Fort Lee, N.J. 07024.

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CW 6

EDITORIAL

Those soaring telecom salaries

Are you worth \$100,000?

A few classified advertisements in *Computerworld* and in large metropolitan daily newspapers are hawking salaries for senior telecommunications executives in precisely that range: \$100,000 and up. Corporate recruiters are offering even more — \$150,000 and up — on behalf of their multibillion-dollar clients. Compensation packages can include medical, dental and life insurance; training programs; bonuses; stock options; relocation reimbursement; and other undisclosed fringe benefits.

What's behind these soaring salaries? Obviously, a bidding war for top-level telecommunications executives is raging among large corporations, fueling the demand for management talent already in short supply. Several other factors are at work here, too. They include the following:

- Banks, financial service companies and insurance firms are competing fiercely via networks to supply products and services to their clients — and to lock out competition.

- The recent rash of corporate mergers and acquisitions requires the integration of huge, previously separate voice/data communications systems.

- Corporations demand quicker access to their cash, forcing banks to move rapidly from batch processing of money transfers to on-line, real-time networks.

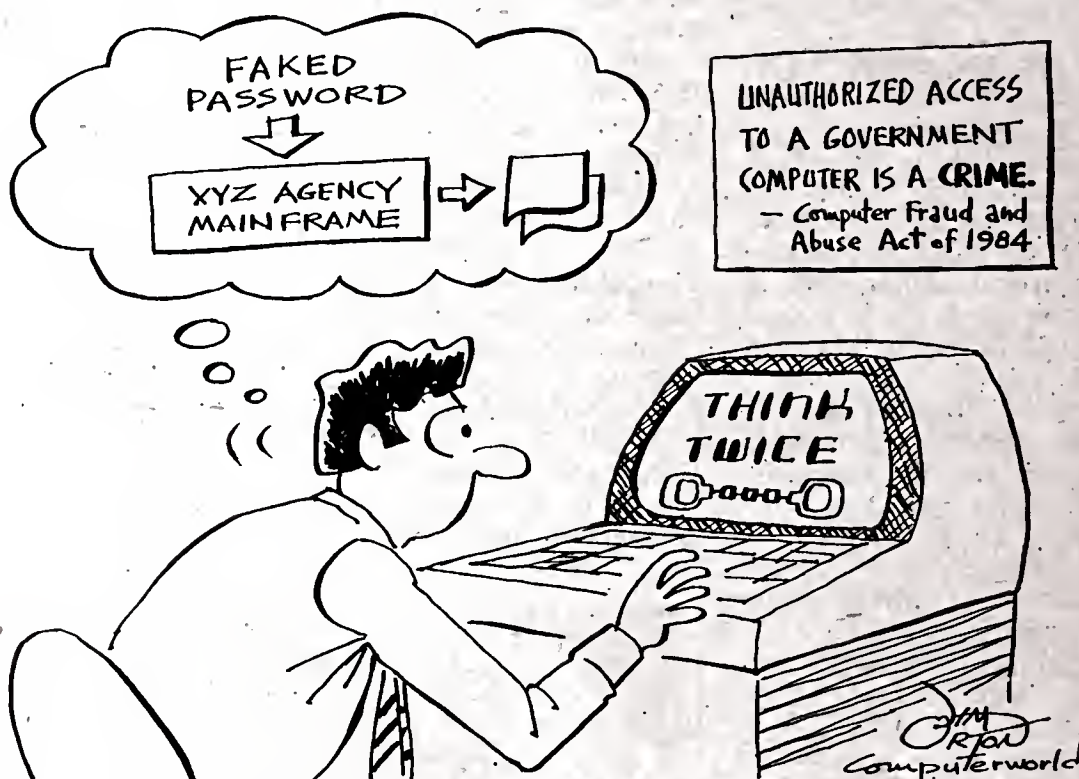
These and other business requirements put a premium on shrewd management of the delivery system, which is telecommunications. The opportunities and rewards — financial and otherwise — over the next three to five years for those who qualify promise to be extraordinary.

You won't qualify, however, unless you can deal with the fallout from the AT&T reorganization, the integration of voice and data transmission, the emergence of new equipment and vendors; unpredictable levels of service, technological breakthroughs, international communications and the explosion of personal computers. But configuring, maintaining and managing the network and its human resources are only half of it.

General business management skills ranging from strategic planning and risk assessment to profit-and-loss forecasting and bottom-line decision making are the other half. Telecommunications departments have usually been viewed as a drain on corporate revenue, ill-equipped to make efficient use of the technologies at their disposal — "an unwelcome and unmanageable expense," in the words of one observer. No more. The refreshing realization is that savvy telecommunications managers can trim costs and perhaps even enhance corporate revenue through such means as capacity resale operations and shared-user systems.

"When telecommunications managers talk to me about increasing the [bit/sec] rate or tripling the number of [automated teller machines] in service, I don't care," stated the president of a major executive search firm.

"The more critical thing is that [the manager] increased uptime from 95% to 99.8% and dropped the per-transaction cost from 5 cents to 3.2 cents. When a guy talks to me that way, I listen, because what he's talking about relates to the guts of the business."



LETTER

Free software philosophy refuted

The letter "Case against free software" [CW, Jan. 21] was well-deserved. I had the misfortune last year to hear Richard Stallman, the subject of that letter and advocate of "free software," speak at a seminar on, of all things, computer ethics. In the course of lawfully expending his views, to which he is constitutionally entitled, he also managed to accuse computer business managers of being thieves and further showed his ignorance by stating that patent law principles ("to encourage invention") should be interpreted as prohibiting software copyright ("to encourage everyone to write software").

Stallman then had the gall to say that he expected reputable firms to hire him as a consultant. Believe me, I heard this with my own ears.

It is hard to judge how much of a threat Stallman really is. He gives the appearance of being a vintage flower child of the '80s. Still, I would not sell him short. He is, at the very least, quite bright and professes antagonism to laws respecting property rights.

Incidentally, the program of the seminar I attended listed Stallman as associated with the MIT Artificial Intelligence Laboratory. Stallman said nothing during his talk to counter this. One could get the impression that he was professionally employed there, but that turned out not to be the case.

Michael H. Agranoff
Hartford, Conn.

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VIEWPOINT

Japan brings world to gigantic science fair



**LECHT
ON SCIENCE**
Charles P. Lecht

The Japanese government will officially open Expo '85, the international science fair, on March 17. It will be a momentous occasion — the opening of the largest such fair the world has ever seen. Fifty countries from all major political blocs are participating. The U.S. will be there, along with its friends from the Common Market, Soviet Union, China, the Organization of Petroleum Exporting Countries and other nations and organizations. The U.S. pavilion is one of the fair's largest: Some 75 trade organizations and numerous companies will participate.

Expo '85 will be held in Tsukuba, about 60 kilometers northeast of Tokyo. Being called "science city" by the Japanese government means exactly what it sounds like: Many educational and research facilities dedicated to scientific pursuits are located in Tsukuba and scientists make up most of its population.

If you love the idea of roaming about a world-class science fair, you may want to figure out how to make it to Tsukuba around cherry-blossom time, but you've got from March 17 to Sept. 15 to do so. I can't think of anything more exciting to do, except perhaps taking a ride on America's space shuttle, going to the moon or spending a month looking through the telescope at Mount Palomar, Calif. Thinking of the fair as a kind of "scientific olympics" (with the understanding that the very best each country can create may not be there for reasons of national security), we can expect what is

Lecht is chairman of Lecht Sciences, Inc., a New York-based think tank specializing in computer and communications technologies.

there to to present a pretty reliable picture of each country's vision of science — and, in many cases, their achievements. In particular, the East-West comparisons should be fascinating.

Official fair literature tells its theme: "man, his dwellings and his surroundings." Michiyuki Isurugi, Japan's minister of state for science and technology and state minister in charge of Expo '85, said, "The goal of this exposition is to give the peo-

”

'We are striving to create a futuristic atmosphere full of hope promised by the 21st century amalgamation of science and technology.'

—Michiyuki Isurugi
Japan state minister of Expo '85

ple from all parts of the world — particularly the younger generation — visions of the benefits to be derived in the next century from the scientific and technological studies undertaken in the waning years of this one. . . . We are striving to create a futuristic atmosphere full of hope and happiness promised by the 21st century amalgamation of science and technology into the dwellings and surroundings of mankind."

We can do nothing but admire the aspirations expressed by Isurugi. The idea of creating a fair dedicated to peaceful pursuits in science in the only country in the world that experienced its fullest meaning in war is inspiring. The fact that the fair has attracted participants from just about all geopolitical camps may give it miracle status. The timing of the Japanese government in sponsoring Expo '85 is perfect; world scientific interest is at

an all-time high.

As it is at any fair in large, developed countries, local pavilions will dominate the fairground. In some countries this would ensure a boring uniformity, but this will not be the case in Japan. Competition there is as fierce as it is here — how else did they make all that progress? Each pavilion will vigorously compete for visitor interest by offering extraordinary cultural and entertainment experiences. A few representative examples follow.

Sony Corp. will present the world's largest television, 25m by 40m, appropriately called the "Jumbotron" (in the country of micro miniaturization yet). IBM Japan's pavilion is dedicated to the "Spirit of Science"; it was designed under the supervision of Leo Esaki, 1973 winner of the Nobel Prize in physics, a director of IBM Japan and an IBM fellow at IBM's Watson Research Center in the U.S. It will invite the visitor to explore the environment we live in, from galaxy to elementary particle, and to conduct experiments on interactive displays in an environment that promises breathtaking surprises. Nippon Telegraph & Telephone Corp. (NTT) will provide a dazzling show with a futuristic vision of emerging information network services. Using personal communications and VDTs, the audience will participate in an event that combines state-of-the-art live communications to locations all over Japan, beautiful digital graphics and original choral music composed for the event.

The TKD pavilion was designed to enable humans to experience sight and sound as if they were birds and other animals. Nippon Electric Co. will provide a space show on 27 video screens, each measuring 133 in. diagonally. The audience sits at terminal devices and may participate in the ensuing events. Matsushita Electric Industrial Co.'s pavilion will include a robot artist that draws a picture of a visitor in less than two minutes, a true holographic image of a clay doll floating in the air

See FAIR page 44

Computing's 'local' needs often overlooked



**HUMAN
CONNECTION**
Jack Stone

The industry's current preoccupation with increasingly complex, more advanced functions and higher capacity personal computers has tended to divert attention from the elementary but significant processing needs that remain unsatisfied for the vast majority of business users. The term "local" seems an appropriate description of these basic needs, which I will later distinguish from those of a "global" character.

These local needs are part of every business manager's administrative data processing repertoire, but they have been handled on a manual basis for so many years that the thought of automating them has been largely ignored, at least until recently. Of course, the most fundamental set of these local functions are the name

and address file, calculator, telephone dialer, notepad, standard data functions or tables and similar routine tasks.

Some of the common characteristics of local functions are small-size files, variable data supplied by the personal computer user and little or no data transmitted to and from other machines. It may come as a shock to many, but these functions constitute a large part of the "real world" of personal computing that has yet to be automated.

Global functions antipodal

"Global" processing functions are antipodal: Large files are typical, variable data is supplied from sources other than the user, and data is regularly transmitted to and from other systems. Not too surprisingly, the global functions — and extensions of the same into every larger hardware system — are currently in vogue.

Now obviously, the automation of these activities is hardly within the purview of data processors or large systems users who have their hands full with the galactic problems associated with grand-scale applications. But they have been of great interest to the purveyors of several high-performance utility packages who have

discovered a gold mine in a new software market.

Why have these packages been rapidly accepted? In a nutshell, users have come to realize that automating even the most prosaic of processing activities is justified on the basis of improved individual work performance — as long as the cost and benefit factors are present. It turns out that, for example, autodialing does save substantial time for the heavy user of the telephone; the capability of storing calculated data for later display and/or printout is advantageous for many; and preparing error-free memos and notes that may be automatically retrieved is an attractive feature for a large population of users.

Local function considerations

There are, however, additional system considerations that can further enhance the performance — and hence, the appeal — of automated local functions. They are the following:

- Rendering invisible, or nearly so, the operating system and all of the complexities associated with it. A user shouldn't have to deal with a host of ancillary commands to execute elementary applications.

- The use of a standard, common file design using American Standard

Code for Information Exchange data codes to facilitate the use of a single editor for all data files and file interchangeability among various applications programs.

- The elimination of all but the truly significant processing options to simplify the system operation and reduce the learning time to the absolute minimum.

- The availability of more advanced, but local, processing functions for those users who have the need but whose designs are based on a minimum set of operating capabilities — for instance, a spreadsheet with only a couple dozen rows rather than a couple thousand rows; a word processor with editing and formatting features suitable for letters and memos but not acceptable for 100-page reports; a modest generalized data base management facility to keep track of small-volume business records; and special-purpose packages such as expense accounting for business trips.

- Finally, a hardware package that fits inside a briefcase and is truly of small volume and low weight. After all, the business manager takes the notepad and calculator wherever he or she travels, and the computing facility should be just as transportable.

Stone is a Washington, D.C.-based independent management consultant, educator and writer, specializing in DP human communications and personnel development.

The be storehouse

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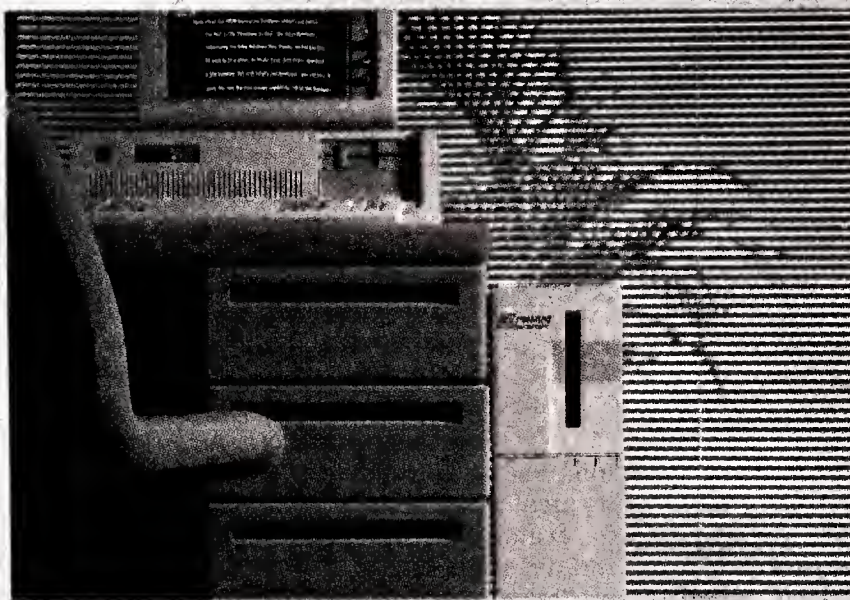
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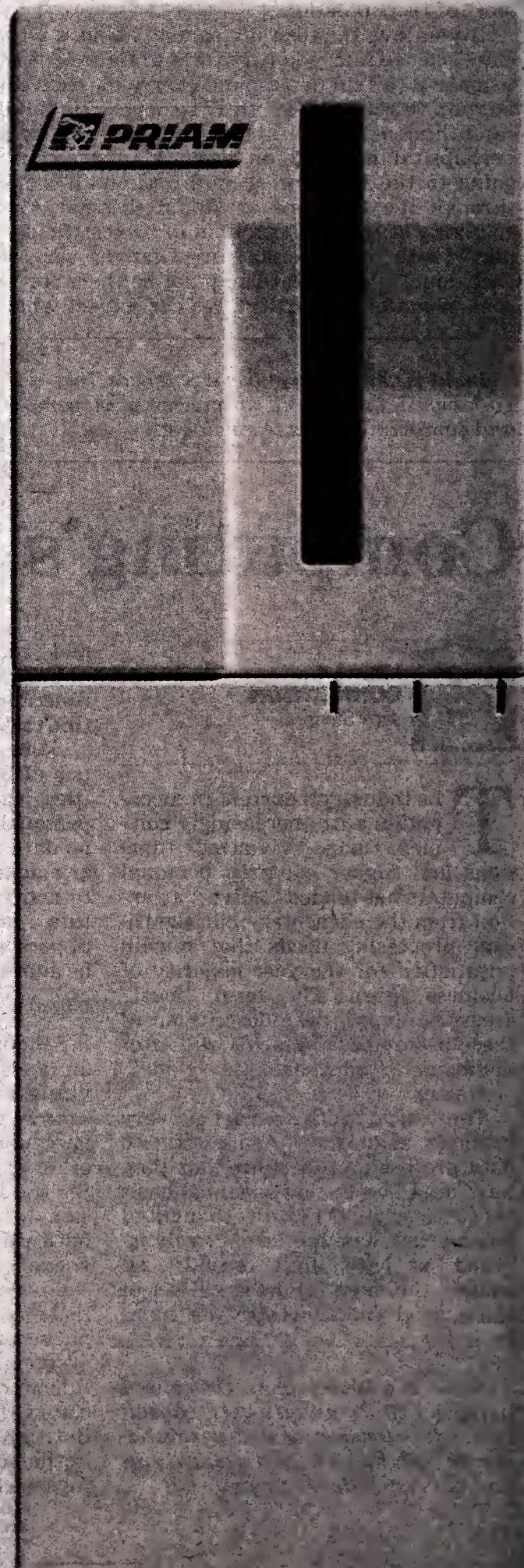
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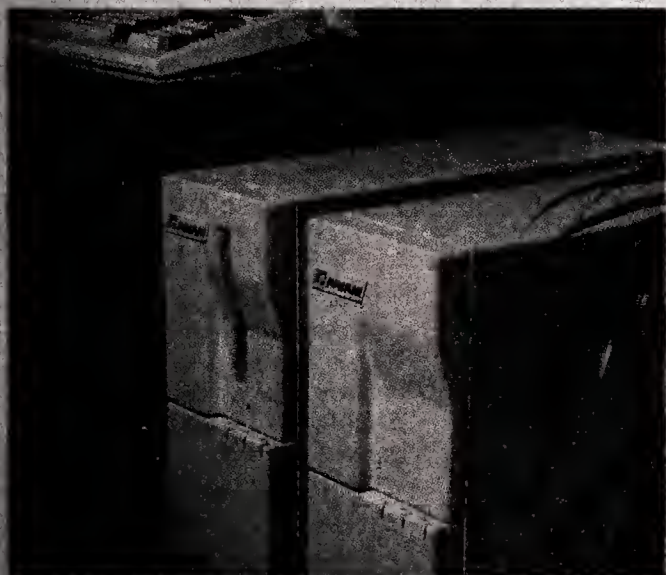
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FAIR from page 41

and a three-dimensional television that can be seen without special glasses.

The Fuyo robot pavilion will present a theatrical performance by robots. A robot will read Bach piano scores with its video eye and will play the music with its artificial fingers while sitting at a standard piano. A vacuum-cleaner robot will help care for the place, and other robot types will be on hand.

The U.S. theme is artificial intelligence. With a panoramic display of high-tech creativity in computer and communications systems, it will present a history of chip development and will demonstrate how far man has come in the development of machines that can think. Whoever conceived of its theme should be congratulated; AI is where it's at these days.

It's hard to tell exactly what is to be shown in the Soviet pavilion, except for

the usual, boring report of Soviet domestic progress and progress in space. But I wouldn't bet on it; the Soviets have been known to give us a surprise or two, like the first artificial satellite and the first man in space. I hope they don't do it again by communicating with the first man on Mars (conditions were right for a launch last year) or providing a life-size hologram of the kremlin.

Noteworthy forum fare

In addition to fare of the kind described above, Expo '85 will provide an opportunity for scientists and others concerned with science to meet in special forums or celebrate important events. Noteworthy in the forum category is International Symposium '85 in Tokyo May 20 and 21. Sponsored by NTT, its theme is "Telecommunications — Today and Tomorrow."

It will be opened by Hisashi Shinto, NTT president, and its lineup of speakers represents a top-flight cross-section of today's "who's who" in telecommunications and computer technology.

Attending the NTT symposium will be John R. Opel, IBM chairman; Koji Kobayashi, NEC Information Systems, Inc. chairman; Louis Mexandeau, minister of Postal Telegraph and Telephone (PTT) authorities, France; H.E. Schwartz-Shilling, PTT minister, West Germany; Megamu Sato, PTT minister, Japan; George Jefferson, president of British Telecom; Ian M. Ross, president of Bell Laboratories; and many others.

In the celebration category, I note America's planned Fourth of July festivities. According to sources, it will be complete with politicians, fireworks and hot dogs. I wouldn't miss it or the fair for that matter. I confess that the enjoyment of seeing the fair's scientific stuff is my overriding motive to go there.

I'm the type who's kept his bag packed for months waiting for a call from the National Aeronautics and Space Administration for a small, bald, bearded guy over 50 who'd like to ride the shuttle.

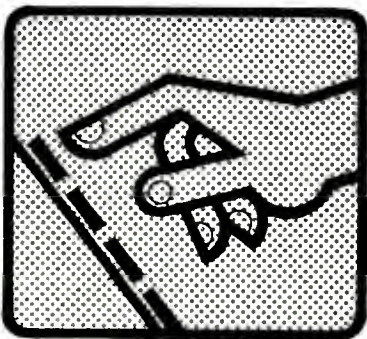
However, I also wouldn't want to miss being an American at a fair that will focus on what Americans do best — and on the Fourth of July, no less!

Computerworld welcomes letters from its readers. Preference will be given to typed, double-spaced letters of 150 words or fewer; they may be edited for clarity and brevity.

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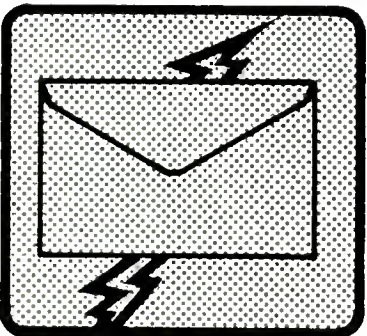


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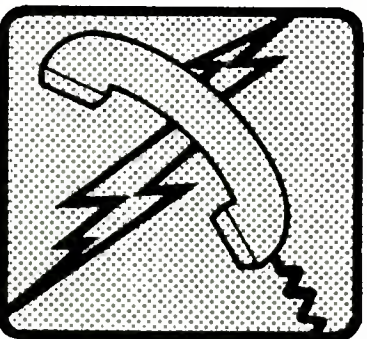
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SOFTWARE & SERVICES



Bernard H. Boar

*Applications prototyping:
Trades guesses for experience*

Applications prototyping has been touted as the answer to everything from whittling down applications backlogs to better satisfying end-user requirements. It is a method for identifying and refining user needs that has been made possible by advances in software technology. But some have questioned whether prototyping is adequately supported by the current generation of applications development tools and whether it unnecessarily extends the development life cycle. Others ponder prototyping's usefulness in maintaining existing applications.

One man who spends a lot of time thinking and talking about prototyping is Bernard H. Boar, author of *Applications Prototyping: A Requirements Definition Strategy for the '80s*. Boar is national director of Software Resources, Inc. of Wayne, Pa., a consulting firm specializing in prototyping and in Cullinet Software, Inc.'s IDMS/R. He was interviewed recently by Computerworld staff writer John Desmond.

Q When did applications prototyping become practical and why?

It became practical because of the shift in technology. Historically, you could not do prototyping because the tools available to build and refine something quickly did not exist. Integrated data dictionaries, screen generators and fourth-generation languages have only come on [the market] in the last three or four years.



Q How does the prototype life cycle differ from the typical applications development life cycle?

It really does not differ much at all. In the traditional life cycle, you do some rigorous or structured analysis, then you design, implement, test, convert [and so on]. But in prototyping, you explode the analysis step into its own miniature life cycle. When you've completed prototyping, you then have to consider a number of options. One is to leverage or refine the prototype itself into the real system,

See **BOAR** page 56



SOFTALK
John Gallant
CW Senior Editor

IBM code rules stir user wrath

Sometimes the thunder is loudest before the rain starts to fall.

Such is the case with IBM's policy regarding restrictions on source code availability for a growing number of its systems software products [CW, May 14].

When IBM made public its intentions to withhold the source code on selected software packages two years ago, many users — especially those in the largest data centers — complained loudly and bitterly about IBM's unilateral decision to alter radically its own standard operating procedure of supplying the valuable source code material to its customers.

Users who were required to make modifications to IBM's systems software in order to tailor it to their own needs

See **CODE** page 54

■ Information Builders, Inc. has announced the Foccalc main-frame spreadsheet for its Focus data base management system/**46**

■ Pansophic Systems, Inc. has included a batch report facility in an enhanced version of its Telon application development system/**46**

■ IBM has moved up the delivery date for three System/36 software packages/**46**

■ IBM's newly announced System Control Programs will be supported on Amdahl Corp.'s 580 series large-scale processors/**46**

SOFTLINE/WILLIAM INMON

Systems tools: Let buyer beware

Software development tools for the programmer have been in existence for a number of years. Tools exist to help in debugging, documentation, performance monitoring and even in the initial generation of code. The track record of these programming tools, for the most part, has been good.

There is currently an explosion of tools aimed not at the traditional activity of coding but at activities that occur in the earlier, conceptual stages of de-

See **INMON** page 51

Inmon is a director at Coopers & Lybrand in Denver, a noted author on the subject of data base design and a regular contributor to Softline.

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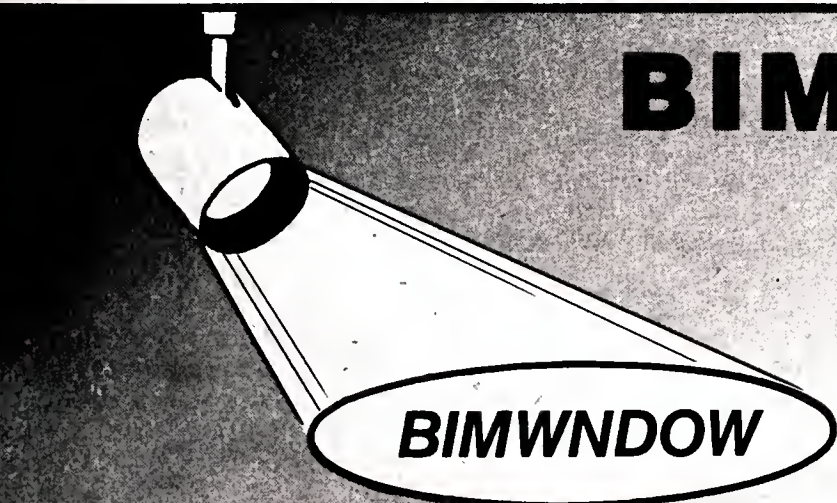
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SOFTWARE & SERVICES

Information Builders announces Foccalc spreadsheet

NEW YORK — Information Builders, Inc. has introduced Foccalc, an optional, integrated mainframe spreadsheet for its Focus fourth-generation language and data base management system. The company also unveiled an IBM SQL/DS interface to Focus.

Foccalc is an on-line spreadsheet for IBM mainframes that reportedly allows users to populate one or more spreadsheet cells with data from Focus report requests against a variety of files and data bases.

Foccalc can load data automatically from a Focus report, according to the vendor, and the spreadsheet's data is available to Focus' reporting, graphics, statistical and financial modeling facilities.

A spokesman said Foccalc can access files and data bases, including IBM's Isam, Vsam, Osam, DL/1, SQL/DS; Cullinet Software, Inc.'s IDMS; Cincom Systems, Inc.'s Total; Software AG of North Amer-

ica, Inc.'s Adabas; Computer Corp. of America's Model 204; Intel Corp.'s System 2000; and Information Builders' Focus.

Foccalc spreadsheets reportedly can be downloaded from the host directly into Lotus Development Corp.'s 1-2-3 through any asynchronous or IBM 3270 Systems Network Architecture/Synchronous Data Link Control link, including Information Builders' PC/Focus and Foccalc links.

Operates in MVS/TSO and VM/CMS environments

Foccalc operates in either an IBM MVS/TSO or VM/CMS environment. It is not available as a stand-alone product.

Foccalc also includes the following features: goal-seeking capabilities, graphics facilities, four methods of depreciation calculation, an internal-rate of return function, time-charting and project-scheduling capabilities and windowing facilities for displaying alternate Foccalc modules.

The VM/CMS version is scheduled for release in May and the MVS version in July.

Foccalc can be purchased for \$12,000 or leased for \$400 per month.

In addition to Foccalc, Information Builders also unveiled a Focus interface to IBM's SQL/DS. The interface enables Focus to process SQL/DS tables and file views.

It also allows users to join relationally multiple SQL/DS tables as well as join SQL/DS tables to other files, including IBM's Vsam, IMS, Qsam and Focus, according to the vendor.

The spokesman said the first release of the Focus SQL/DS interface operates under IBM's VM/CMS against CMS SQL/DS tables.

The product is scheduled for release in April and can be purchased for \$8,500 or leased for \$240 per month.

Information Builders is located at 1250 Broadway, New York, N.Y. 10001.

Pansophic Systems offers batch report facility for Telon system

OAK BROOK, Ill. — Pansophic Systems, Inc. has announced that a batch report facility is included in an enhanced version of its Telon applications development productivity system for IBM's IMS-DC and CICS environments.

Telon 1.3 comprises the following three software components: the Telon design facility for providing interactive and rapid screen designs; an applications system generator for

generating structured Cobol or PL/I code from design-level source statements; and a modeling and testing facility for interactive testing and debugging.

A spokesman said the batch report facility extends the interactive design savings of Telon IMS-DC and Telon CICS into the batch environment. The facility generates either Cobol or PL/I source programs.

The same data base definition

techniques used by the Telon on-line products are used in the batch facility. Additional Cobol or PL/I logic can be provided to give the flexibility and functionality required in production systems.

The batch feature of the release is an extension of Telon IMS-DC and CICS products.

Other enhancements in Telon 1.3 include the following: generation of on-line optimization routines as an

option; performance improvements for CICS programs, including the Telon design facility when running under CICS; easier definition and control of IMS-DC options; and panel swapping within the Telon design facility.

Telon 1.3 is priced at \$115,000 for IMS-DC. The CICS version is priced at \$80,000.

Pansophic is located at 709 Enterprise Drive, Oak Brook, Ill. 60521.

IBM moves up delivery date for three System/36 packages

RYEBROOK, N.Y. — IBM Information Systems Group has accelerated the delivery schedule for three System/36 software packages.

Release 3.0 of the System/36 SSP operating system, Displaywrite/36 and Query/36 will ship in April, rather than the July time frame announced when the programs debuted in October, a spokesman said.

The release of the SSP operating system reportedly will provide distributed data management capabilities, allowing one System/36 application to access files stored on another. Release 3.0 of System/36 SSP also will support IBM Office Systems

Family packages for the System/36 announced in October. It carries a one-time charge of \$4,000. The distributed data feature costs an added \$2,500.

Displaywrite/36, priced at \$2,000, is a text editor that offers interfaces and functions similar to those of the IBM Displaywriter. Seven language dictionaries for the program also will be offered in April, IBM said.

Query/36 is a menu-driven information retrieval package that carries a one-time license fee of \$950.

IBM Information Systems Group is located at 900 King St., Rye Brook, N.Y. 10573.

Amdahl 580s to support IBM tools

SUNNYVALE, Calif. — Amdahl Corp. has announced that its 580 series mainframes will support System Control Program (SCP) software recently announced by IBM [CW, Feb. 18].

A spokesman said the Amdahl processors will support the following IBM software: Version 2, Release 1.3 of MVS/SP, which provides support for IBM's 3090 processors in Extended Architecture (XA) mode; Version 1, Release 3.5 of MVS/SP, which provides support for the 3090 in 370 mode; and VM/SP HPO Releases 3.6 and 4.2, which support IBM's 3090 Model 200 in 370 mode.

The spokesman said Amdahl does not plan to support the VM/XA Systems Facility, which supersedes Release 2 of IBM's VM/XA Migration Aid.

Amdahl said the 580's architecture allows the company's 580/Multiple Domain Feature to control more efficiently the execution of multiple SCPs on a single processor. The spokesman said this feature provides the benefits of the VM/XA Systems Facility.

More information is available from Amdahl, which can be reached through P.O. Box 470, 1250 E. Arques Ave., Sunnyvale, Calif. 94086.



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SOFTWARE & SERVICES

INMON from page 45

sign. Today's system development tools do such things as aiding in functional decomposition, automating data modeling, assisting in abstraction analysis, normalizing data and a whole host of related tasks that are germane to the early analysis and design of a system.

Analytical tools attempt to automate — with a certain amount of discipline — the activities of the system developer, and these tools hold a great deal of promise.

But there is danger in the use of these analytic tools and the expectations many developers hold. The danger lies in the way the tools are being sold and in the buyers' perception of what it is that the tools will do for them. Vendors who wish to express the power of their tools paint them in the very best light.

While there is no harm in this perception, many customers look at tools as the sole answer to proper analysis and design, rather than as aids to enhance analysis and design. Given marketplace hype, it is very easy to confuse tools that can be

”

It is very easy to confuse tools that can be used to produce a proper solution with the proper solution itself.

used to produce a proper solution with the proper solution itself. In other words, the customer believes that all that is needed to produce a design is to acquire and install an analytical tool.

As one example, consider the data dictionary. Data dictionary software is used to hold an inventory of a shop's data. The need for data dictionaries became apparent when the industry progressed from having a few applications systems to many. Many shops approached the data dictionary as the means to control data.

However, some of the major shortcomings of the data dictionary as the ideal solution to controlling data began to appear in short order. Those problems included the following:

- The same data element was defined in multiple ways.
- Whole systems were not put up on the data dictionary.
- Private libraries and dictionaries were kept, causing the data dictionary to be only another source of information.
- Programmers built dummy data descriptions that were understandable to them but to no one else.

The data dictionary as a technical tool to solve administrative data problems was an unequivocal failure. But those shops with discipline and an administrative approach to DP's problems enjoyed success with the dictionary. Those shops that relied on the dictionary to instill discipline where previously there was none wasted manpower and machine resources and ultimately were as undisciplined after the dictionary installation as they were before. The point is that the data dictionary is only a tool, not a solution.

The same can be said for today's analytical development tools. Even

the best analytical tool is no better than its designer's skills. A designer who does not understand system fundamentals will create failures even with the best analytical tools. A designer who understands the fundamentals of good design will produce good designs, even with crude tools.

Today's analytic tools do have some significant advantages when used properly. They can do the following:

- Speed solutions.
- Help the designer recognize and manage complexities.
- Document solutions.
- Be used to point out discernible errors and inconsistencies.

But today's tools are not solutions in and of themselves, however strong the vendor hype. Any designer who thinks tools alone will produce sound designs is in for a shock.

Factory system enhanced

BEDFORD, Mass. — Computervision Corp. has enhanced its Factoryvision factory-floor management information system to provide direct access to machine tool and automated work center control on a shop floor.

Machine Tool Management system is integrated with the Planning and Production modules of the Factoryvision system. Factoryvision is a 32-bit microcomputer-based system for distributing and controlling graphics, text and numerical control information created on a computer-aided design and manufacturing system.

Data required to control machinery is distributed through a Machine Interface Device (MID) at each automated work center. The machine con-

trol file, accessed locally from the interface device or the central distribution center, passes the information to the machine tool through an RS-232 interface or by emulating a tape reader.

The MID also provides local data storage and functions, including the ability to load, edit, verify and send machine instructions to tools for execution in a stand-alone environment.

The Machine Tool Management software and the MID will be available in the second quarter. Cost of a fully configured Factoryvision system for 16 full-time users is approximately \$13,000 per seat.

Computervision is located at 15 Crosby Drive, Bedford, Mass. 01730.

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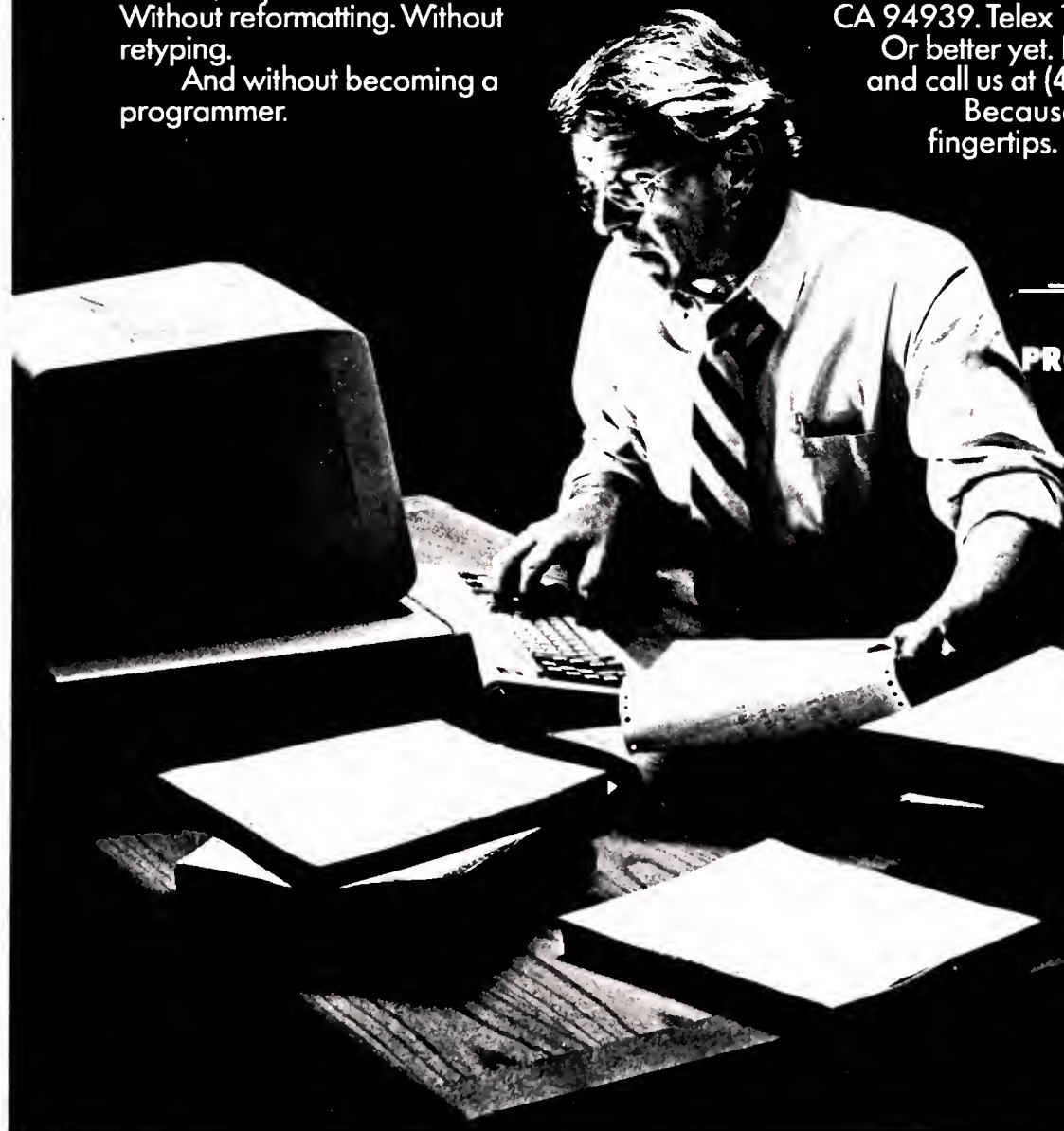
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SOFTWARE & SERVICES

CODE from page 45

were vehement in their protest against what has come to be known as IBM's "object-code-only" policy. Other users, typically those in smaller MIS departments, who saw little need to modify or enhance the "vanilla" software Big Blue supplied, were less affected and, thus, less vocal about the change in direction.

IBM's object-code-only policy was a defense mechanism, a move designed to combat a perceived threat to its software market position from other vendors and the Japanese. The software giant rebutted user complaints by saying that the policy lessened the number of problems it faced in trying to install enhanced versions of its software at sites where numerous user modifications had been made to systems software.

Users, on the other hand, said that IBM had reversed its long-held course with little warning and with little concern for the effect the new policy would have on them. Some said IBM was displaying supreme arrogance in attempting to protect them from having to modify its software.

But perhaps the most outspoken group was users who complained that the absence of source code would make it extremely difficult, if not outright impossible, to determine the causes of software problems. Without the source code map, users lamented that they would be helpless in the face of a software problem until the IBM service representative arrived.

It has been quite awhile since IBM announced its object-code-only intentions, and much of the thunder that

rumbled throughout the user community has died away. Now, however, the rain has started to fall. The products first placed under the source code restrictions are beginning to make their way into DP shops, and

users are being forced to cope with the inclement weather for the first time.

One prime example of the uneasiness the object-code-only policy has spawned involves IBM's VS Cobol II compiler, a blending of mainly Cobol-74 standards and some Cobol-80 extensions outlined in an early draft of that standard.

Trans World Airlines, Inc. (TWA) in Kansas City, Mo., is one of the early users of IBM's VS Cobol II. TWA's relationship with IBM is clearly not an adversarial one; in fact, the airline undertook field testing of the compiler and participated

in IBM's Early Support Program (ESP) evaluation of it. Indeed, TWA has had nothing but praise for the capabilities of the product and was even willing to relate its favorable experiences with VS Cobol II to the press. Consider the words of Rex Widmer, technical specialist in applications development support.

"VS Cobol II, as far as I can tell, is the most thoroughly tested language product IBM has ever brought to market," he said. "To my knowledge, field tests and [the ESP evaluation] were not used for language products in the past. But IBM put a large effort into getting quality into this product."

Thus, while Widmer's words of praise ring true, so also do his words of concern about IBM's object-code-only policy regarding VS Cobol II, which he said is one of the first such source-code-restricted products to hit the market. (VS Cobol II went into general release earlier this year.)

Widmer's worries are based not on

"

[Users] said IBM was displaying supreme arrogance in attempting to protect them from having to modify its software.

the absence of source material for the compiler itself, but on the nonavailability of source code for the associated runtime package vital to the applications developed via VS Cobol II. "VS Cobol II is object-code-only," Widmer explained. "With every previous IBM Cobol product we could always get, if we asked, source for the compiler, which nobody cared about, and for the runtime package, which a lot of people cared about. Those object-code-only runtime packages are embedded in our applications. If, say, our payroll application blows up at three in the morning, how are we going to get diagnosis or service to bypass that problem, whether it is user or system caused, in time to make our payroll?"

Although Widmer expressed no complaints about IBM's service capabilities, he lamented the need for his DP staff to rely solely on IBM in times of need.

"In the past, larger customers could use the runtime source to diagnose problems. We are now much more dependent on IBM for service, diagnosis, bypass and repair," he said.

Widmer said he is certain IBM can step up to the responsibilities involved in servicing such an object-code-only product. But it remains to be seen how the policy will affect his shop and others like it. Widmer's concerns are real, and it is clearly IBM's responsibility to see that the policy it has developed to protect its interests does not have a detrimental effect on the interests of its customers, which are no less important.

Perhaps it is time for IBM to sit down with concerned users and work out an equitable method for ensuring that the object-code-only policy does not come to represent just another headache for its customers.

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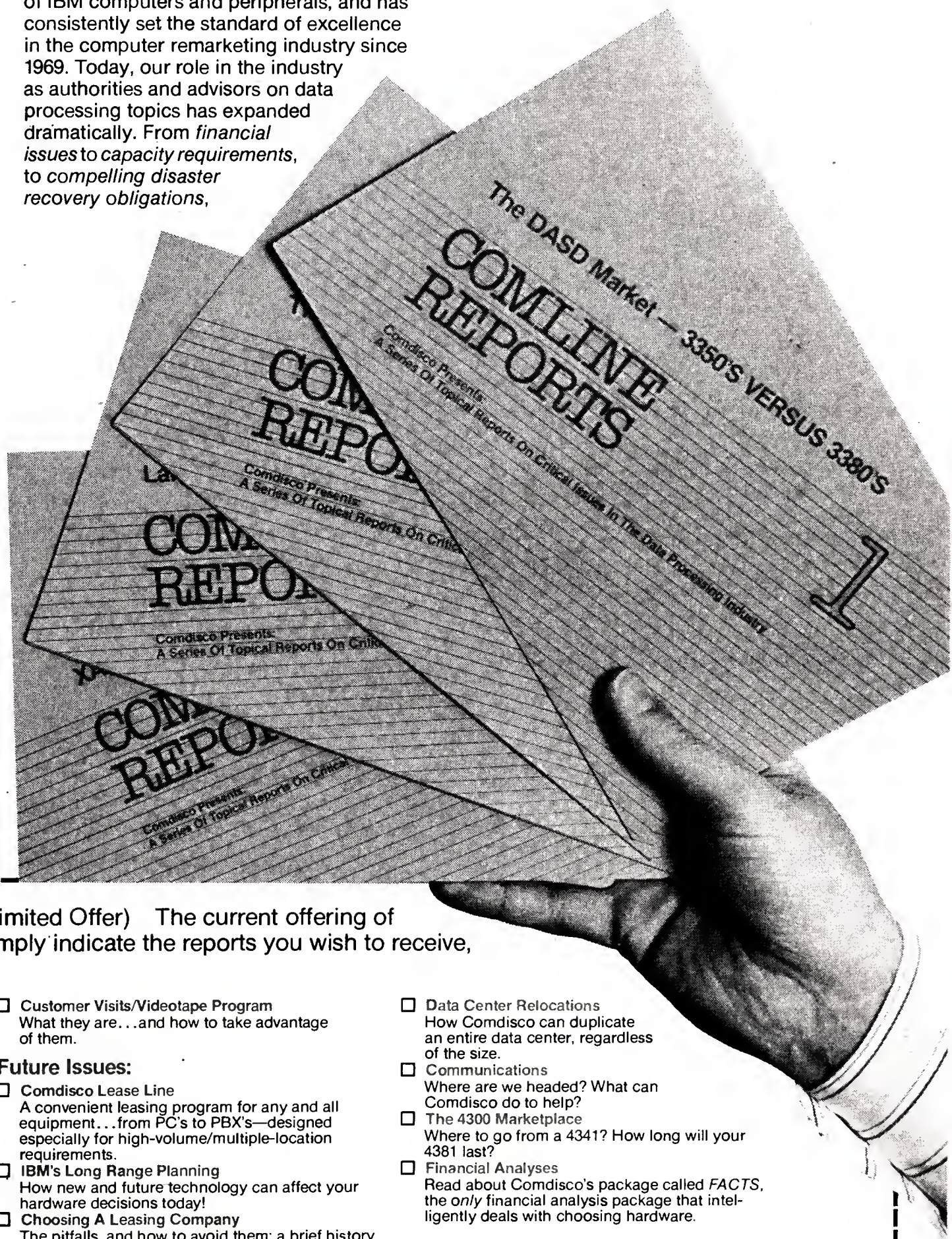
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SOFTWARE & SERVICES

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taking into account all operational constraints.

Q When you add the prototyping stage, do you run the risk of adding too much time to the development life cycle?

No, it's just the opposite: you shorten it. There are two types of implementation dates. Most systems have a political implementation date. When the system is first implemented, the developers then have another date, maybe nine months or a year later, when after all the rework the system actually works the way the user wants. With prototyping, those two dates coincide. It is meaningless to talk about implementation dates when you're delivering something that fundamentally does not meet user requirements.

Q What can prototyping do to reduce an applications backlog?

Like all productivity techniques, prototyping is geared to doing things correctly in the first place and to doing them more quickly. Most people agree that the cost of changing a system during the analysis phase is 50 to 100 times less expensive than changing it after implementation. It's my belief that you're better off building a model to get a better set of requirements.

Q To prototype effectively, do companies need a prototyping specialist or can any programmer do the job?

When you introduce any new technology or approach, it helps to have specialists in the beginning. Over time I believe that the ability to do prototyping will become just another skill of a project leader. The senior people today who make the current procedures work are the same people who can make prototyping work in the beginning.

Q Is prototyping also good insurance for the data center, meaning that users cannot come back and say the applications do not meet their requirements?

If you are the user's manager or the software development manager, you will reduce your exposure to failure by having users verify a

working model sooner. If users see the working model, and after iteration they cannot reach agreement, it doesn't pay to devote 30 people to building the system. So I think it's an insurance policy for everybody.

In the engineering world, including mechanical and electrical engineering, building models and verifying models is the accepted way to do things. All I am suggesting is that the same approach used in other engineering dis-

ciplines be used for software design.

Q How does a development center decide what is to be prototyped if a center cannot prototype all applications?

There are certain applications that lend themselves better to prototyping. In general, transaction processing and record management systems and systems where a great number of users are spread over a wide geograph-

ic area are good candidates. It's a matter of which systems offer maximum return or which have the greatest risk of failure. For systems in which prespecification would work better, I think you should proceed with that.

Q What are some examples of those?

Heavy algorithmic systems. If the system has a lot of mathematical formulas, computations and heavy cal-

culations, there's no leverage in that. An algorithm is correct or wrong. Batch updating portions of systems are also not very good candidates for prototyping. I have not seen technology in the batch [processing] world that really lets you do a "quick-build" well. Also, the nature of batch [processing] is that users do not get as involved as they do with real-time systems. That could be something for psychologists to study.

Where programmers live their

If you want to take a look at programming from a different point of view, take a look at a Smart Desk equipped with an IBM 3270 Personal Computer.

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Q You make the analogy in the book between prototyping and a child's Playdoh, Tinker Toys and Erector Sets. Can you explain that?

Children's toys like those are very modular technologies that let somebody build something quickly, show it to others and ask them what they think.

If someone criticizes it, they can unplug the pieces and plug them back together in another way. The same

thing is happening with some of the fourth-generation software technologies. One piece will be a screen; another piece will be a field edit; another piece will be a functional module.

The emerging software technology lets users change their minds. The experience of seeing what they asked for causes users to evolve their thinking.

Q Is prototyping useful at all for maintaining

or enhancing older or existing applications?

One could argue that existing systems can be viewed as a prototype, as a baseline set of requirements. You apply a bunch of changes from the user or wherever and apply them to the test version of the system and get users to verify that it is what they want.

Q Does the current generation of applications development tools, as op-

posed to fourth-generation languages, adequately support applications prototyping?

I see four types of prototyping: screen only, screen with literals and flow, screens with editing and full-function screens. A lot of technologies can support the first two types. For the last two, the number of technologies is limited. The key thing that makes prototyping possible is not fourth-generation languages; it is integrat-

ed and active data dictionaries.

An active dictionary system will automatically maintain documentation about a prototype, elements, records and where they are used. The trick I found with building prototypes was really not building the original model. The trick was changing it. And to change [that original model], you needed automated documentation. An active dictionary-based system can do that.

Users can expand fields of vision.



Interfaces for Focus announced

NEW YORK — Information Builders, Inc. has announced Release 2.0 of the Focus IMS/DB Interface and Release 3.0 of the Focus IMS/DC Interface, both of which allow users to execute reporting, financial modeling and data analysis functions against IBM's IMS data base.

A spokesman said IMS/DB Interface 2.0 now provides full support for IMS data bases that use the Hierarchical Direct Access Method and have group key fields, segment redefinitions or variable length segments. It also supports IMS key fields and search fields composed of elementary data items of the same or different formats. IMS data base segments that have multiple definitions can now be described to Focus via the field name Rectype.

The IMS/DB Interface 2.0 supports variable length segments, repeating fields or repeating groups of adjacent fields in the same segment.

Focus IMS/DC Interface 3.0 provides users with a full-screen data entry facility. The IMS/DB Interface allows Focus to access IMS data bases from multiple environments, including IBM's TSO, CICS, IMS/DC or batch submission. IMS/DC enables users to access IMS data bases, Focus data bases and other existing OS files from an IMS/DC terminal.

IMS/DB and IMS/DC each sell for \$8,500; each can be licensed for \$240 per month.

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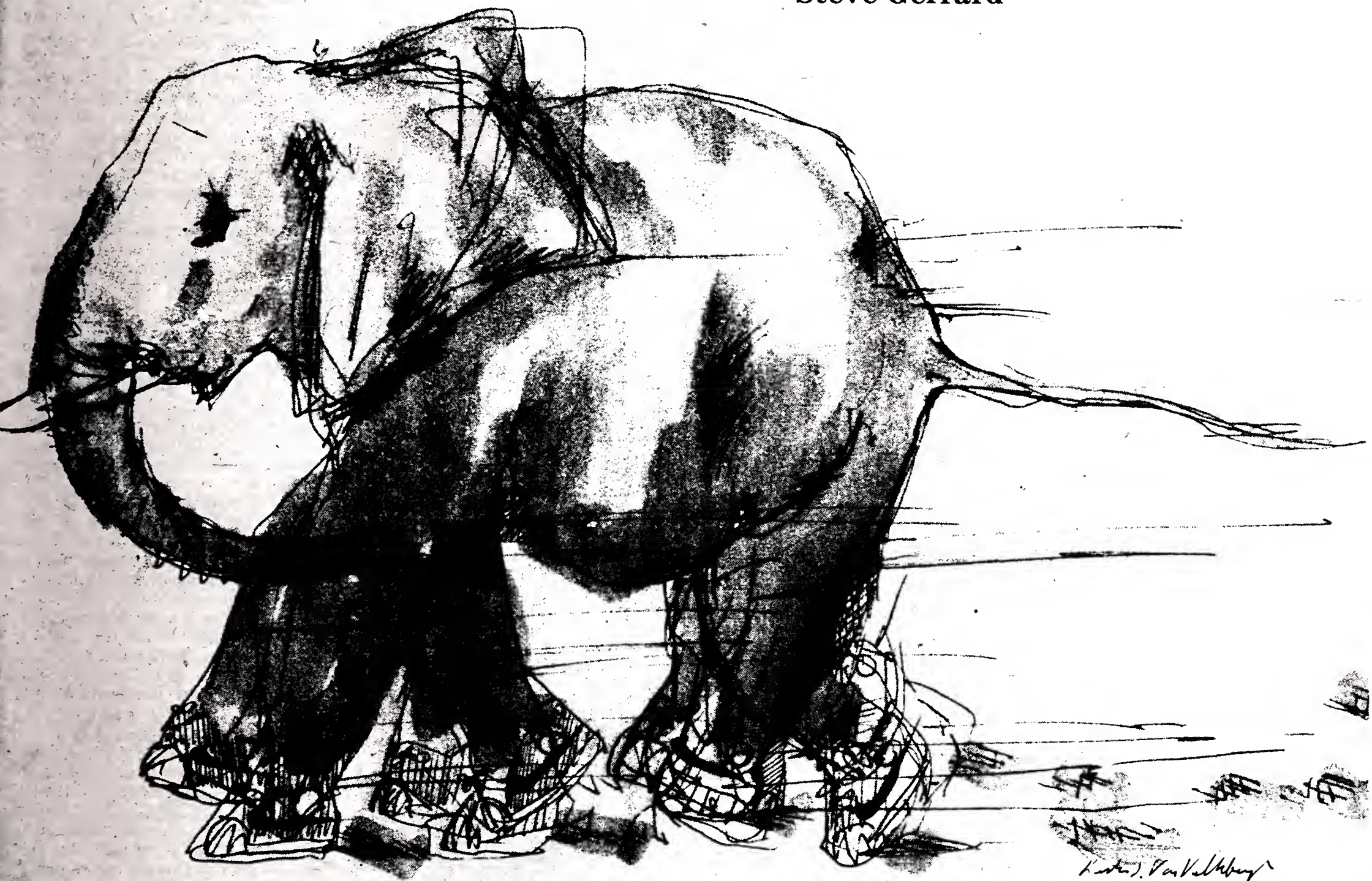
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IN DEPTH

Relational DBMS

By Ed Millsap,
Ken Sloan and
Steve Gerrard



They can run faster than you might think

Computer science has offered the golden apple of relational data base technology for more than 15 years. The promises of less data redundancy and increased accessibility in a production environment, a query situation and in development have been overlooked by a segment of the data processing industry still operating with inflexible structures, fragmented files and duplicate data storage.

Some organizations are too eager to believe that relational data base management systems (DBMS) can be used only for small-volume applications or only in the information center.

Relational DBMS have proven their worth in ease of use and

flexibility. They can form the basis for much greater application development productivity than can ever be achieved with older DBMS approaches. Don't we want to achieve those benefits for all applications? Are data processing professionals doomed to sit on the sidelines while end users enjoy the power and productivity of the relational approach? Are relational systems too slow for high-volume business applications?

The relational performance controversy certainly is not new. But the true significance of the performance question is often not fully appreciated. Simply put: If relational DBMS can prove themselves in high-volume production applications, then no single reason remains for implementing any other

Relational DBMS can meet and even exceed the performance demands of high-volume applications. Will DP sit on the sidelines while end users enjoy the power and productivity of relational systems?

IN DEPTH/RELATIONAL DBMS

Installation type	Records	Daily data base requests	Daily updates
(all figures in thousands)			
Wholesaler	5,500	58,000	34,800
Insurance	30,000	8,000	4,000
Bank	4,000	6,000	1,350
Computer services	10,000	4,000	300
Education	1,300	3,000	1,000
Manufacturing	2,500	2,000	400
Hotel chain	1,000	1,000	500
Specialty retailing	4,000	1,000	580
Convenience store distributor	15,000	1,000	90

Figure 1

kind of DBMS.

The performance question is vital. Even proponents of older DBMS have gradually given the edge to relational DBMS in virtually every other facet except performance. If relational systems are much easier to use, more flexible and more productive for everyone, no overriding reasons exist for continuing with the previous generation of DBMS technology.

Why not Roman numerals?

The reluctant progress of many network and hierarchical DBMS champions toward a half-hearted embrace of relational technology is no doubt reminiscent of the introduction of Arabic numerals into the unwilling Roman Empire.

Can you imagine what it must have been like to have been a guru in Roman numerals at that time?

Your expertise is Roman numerals. Nobody can do long division in Roman numerals like you (you're so good you may even have a consulting practice — people seek your organization out for Roman numerals project implementation guidance). But all of a sudden, people are beginning to get excited about this new concept — Arabic numerals. Your reaction goes through the same stages as the network and hierarchical DBMS proponents of today:

1. *Denial.* First, you simply deny that the new technology is good for anything. You contend that it "may be an interesting academic theory," but it's simply not practical. After all, the whole empire — its tax rolls, markets and business — runs on Roman numerals. And besides, Roman numbers are often easier. One plus one equals two, *literally*, in Roman numerals.

But the ground swell for Arabic numbers becomes too much — people are discovering that they really can be useful — so you move to the next stage, which is:

2. *One foot in the boat.* You contend that Arabic numbers "are good, but only for certain things." They may be great for multiplication and division, but you just can't beat Roman numerals for addition and subtraction (the high-volume applications in the empire).

This is where most supporters of older DBMS are today. Relational DBMS are now admitted to be good — but only for certain things. And, just as with the Roman numerals guru, this contingent will ultimately arrive at the third stage.

3. *Grudging acceptance.* Arabic numerals finally demonstrate that they are just as good (even better) than Roman numerals for any operation. At this stage, like many DBMS experts of today, you attempt to point out that you were really behind the Arabic numeral movement all along and that you are, in fact, the world's leading expert in this new technology.

When reality sinks in, the attention of the world focuses on the new issue of how to convert the empire from one system to the other. Likewise, in the late '80s and early '90s, the preeminent technical DBMS issue will not be the debate over the usefulness or performance of relational DBMS but the monumental conversion problems faced by organizations that will be forced to modernize their DBMS approach in order to avoid drowning in a sea of low productivity and inflexibility.

DBMS performance has become the last stand for older DBMS. We are asked to believe that DP organizations simply have to accept and live with all the overly complex and limiting DBMS technologies of the past. Not only that, but in order to support the information center, they must invest additional hardware and human resources in attempting to manage dual DBMS environments, complete with redundant extract files, differing approaches to data administration, different methods and different procedures.

Indeed, early academic implementations of the relational model did exhibit poor performance. But research and development have marched ahead.

Relational DBMS are indeed being used for high-volume production applications today (see examples in Figure 1). And every day, more and

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IN DEPTH/RELATIONAL DBMS

more organizations are applying relational DBMS technology to the demanding business applications that formerly were considered the exclusive realm of network and hierarchical DBMS.

Comparing more with less

One problem in comparing relational DBMS with their older counterparts is simply that relational DBMS are capable of much more. They can support more powerful, more complex data base searches, they support much higher level query expressions, and they are capable of representing more complex data relationships. As E.F. Codd pointed out in his Turing Award acceptance lecture, comparisons often are made between a relational system doing a complex operation and a nonrelational system doing something relatively simple.

Relational DBMS certainly are powerful, and they do support conceptually very complex operations (the kind of operations that traditional high-volume production applications do not). In addition, a relational DBMS will allow a user to search the DBMS without regard for the access paths defined to it. In fact, a true relational DBMS hides indexing or access path information from the average user; all data operations are expressed in a pure logical form.

But are we comparing apples with apples? High-volume production applications most often perform relatively simple, straightforward data base searches and updates. They al-

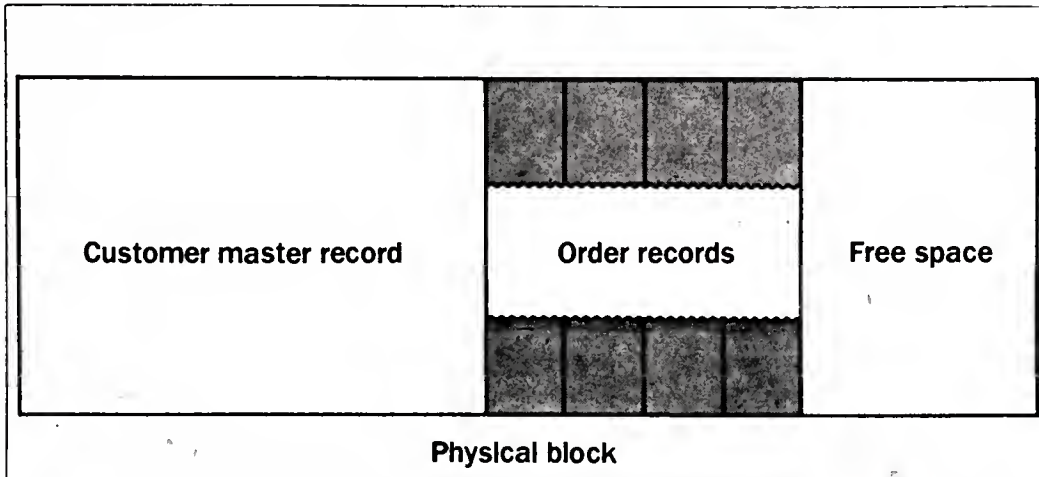


Figure 2. Relational DBMS can support record colocation.

most always use a very common access path to the data, such as an account or customer number. We need to ask whether relational DBMS can achieve comparable performance levels in these simple operations and then ask whether the more complex operations not supported by other DBMS have an unduly negative impact on production system performance.

Relational DBMS are successful today in the production arena. A number of technical advances enable relational DBMS to support these applications.

Record colocation

Traditional DBMS have long provided the ability to store related records together in the same physical data block — for instance, store a customer's order records next to the customer's master record, as in Figure 2. Thus, when the application needs to find orders for a given cus-

tomers or add a new order, disk I/O events are few.

Early academic implementations and a number of contemporary commercial implementations of relational DBMS suffer because customer master records and customer order records were stored in separate, individual tables. This arrangement resulted in more I/O events when the records were processed together. But newer relational DBMS now permit records (tuples) from different logical tables to be stored together in the same data block — in other words, exactly the same benefit as older DBMS. Yet this result is accomplished without the use of embedded pointer techniques, which would seriously compromise relational DBMS flexibility and benefits.

Tables do not have to be physically separated at the disk storage level; they only need to be independent from the standpoint of logical DBMS operations. Just this one improve-

ment of allowing records from multiple tables to coexist at the disk storage level greatly narrows the performance gap between older DBMS and relational DBMS. Other performance enhancements discussed below close the gap completely.

Pipeline technique

Another improvement in commercial relational DBMS technology has allowed production updates to be logically grouped. The relational DBMS can treat many updates as a single unit and thus eliminate redundant I/O events by combining them. For example, if an order contains numerous line items, all those records can be added to the line item table with just one I/O event to the data area instead of an individual I/O event for each line item in the order.

This performance feature was designed especially for high-volume production applications. I/O events can be combined not only for data records themselves, but also for the associated log records and index entries. This technique is not always found in older DBMS.

Relational DBMS can actually offer more sophisticated performance options for managing data space on disk than older DBMS. These options allow the data base administrator to vary the approach to space management at the table (or individual record type) level, not at the overall data base level. This gives the data base administrator greater freedom to establish space management

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<--OSNAME-->		VOLSER	ALLOC	USED	EX	ORG	RECFM	BLKSIZE	LRECL	LASTREF
SPF	A42.CNTL	TS0010	3	2	1	PS	FB	3120	80	06/23/84
B	APROJ.TEXT	TS0012	8	6	1	PS	FB	3120	80	07/08/84
FSE	B13.COBOL	TS0008	10	8	1	PS	FB	3120	80	08/13/84
OEL	CP21.TEXT	TS0007	6	8	1	PS	VB	3120	255	08/23/84
REN	GEN.FORT	TS0005	4	3	1	PS	FB	1600	80	09/20/84
COPY	EZ.ASM	TS0002	3	3	1	PS	FB	3120	80	10/02/84
SUB	FM001.CNTL	TS0006	1	1	1	PS	FB	3120	80	04/12/84
PRNT	G20.LIST	TS0003	20	16	1	PS	VB	3120	255	09/20/84
COMP	HOL.TEXT	TS0008	30	30	3	PO	VB	3120	255	10/15/84
RLSE	IM00EL.LOAD	TS0010	50	16	1	PO	U	0	19069	08/03/84
LM	JCL1.CNTL	TS0002	20	16	1	PO	FB	3120	80	09/15/84
FREE	KA.COBOL	TS0004	6	5	1	PS	FB	3120	80	08/20/84
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IN DEPTH/RELATIONAL DBMS

procedures that are oriented to the needs of individual applications.

Examples of application-oriented space management techniques include the following:

Linear space. Used for nonvolatile tables, linear space simply places new records into the next available position when added. This approach gives the highest add density, requires very little processing to search for free spaces and executes fast. It is an option not supported by older DBMS.

Revolving space. Revolving space management was designed for applications that add new records in some ascending sequence and remove older records from the bottom of the list. Rotating data space management algorithms optimize record additions and treat the data space as a revolving file. Space from deleted records

is automatically reclaimed and re-used when appropriate.

Random space. For work records or transactions processed in random order that do not require sequential processing, random space management provides a fast method of placing records on disk. Any available data block currently residing in memory will be used to hold the record; no I/O is needed to find free space.

Cluster space. Cluster space man-

agement combines random space with a clustering of related data records. This technique is optimal for applications that must combine random and sequential processing services. This option supports rapid, grouped additions, updates and deletes and continues to optimize the placement of records for high-speed retrieval and processing.

A common argument against the viability of relational DBMS is the old saying, "You just can't afford the

overhead for the index." Benchmarks in recent years, in which index-based systems have equaled link-list systems in virtually every area of performance, have largely disproved this argument. But it is important to examine the whole issue of index management, because it is an area in which great performance variations between relational systems will be found. Rapid index management is the key to providing a truly high-performance relational DBMS.

One important distinction cannot be overemphasized: In all other DBMS, predefined access paths must exist in order to do any processing against the DBMS. These access paths will usually be indexed or "hashed." But in a relational DBMS, no access paths need to be predefined. The index is invisible to the user of the DBMS.

In a relational system, the index becomes a powerful tool that the data base administrator can use to optimize production processing. At the same time, the absence of a specific index does not prevent an end user from accessing or processing against the data base. The end result, as has long been recognized, is a substantial increase in productivity, ease of use and the ability to change DBMS access paths without modifying existing applications. Those benefits can now be achieved without a major performance sacrifice.

Combined index techniques

A major improvement in index management technology began to appear in 1982 with the advent of combined indexes.

Many relational systems employ separate, individual indexes for each and every table in the data base. Thus, if a data base contains customer records, order records and payment records in three different tables — and if "customer number" is to be an indexed access path to each table — then most index-based systems (relational or otherwise) would generate three sets of indexes, one for each table. In addition, the same customer number, say 1382, would appear redundantly in each table's index (see Figure 3).

Worse yet, if a program needed to examine the orders and payments for a given customer, many I/O events would be necessary to access each index and assimilate all the records.

Figure 4 shows how a combined index solves these problems. A relational DBMS with a combined index will have only one index for the entire data base. Following the example above, there would be only one index for all customer numbers, and a given customer number would appear in the index only once, followed by all record addresses for that customer number. With only one probe to the combined index, all records for a given customer and their exact disk locations can be known. This situation allows the relational DBMS to optimize the joining of any two or more records based upon a common index value.

For production applications, which process a known set of transactions based upon known access criteria, a combined index approach will easily permit high-volume processes to be optimized. And, when used in conjunction with the cluster space, colocation and pipeline data management techniques described

”

It is important to examine the whole issue of index management, because it is an area in which great performance variations between relational systems will be found.

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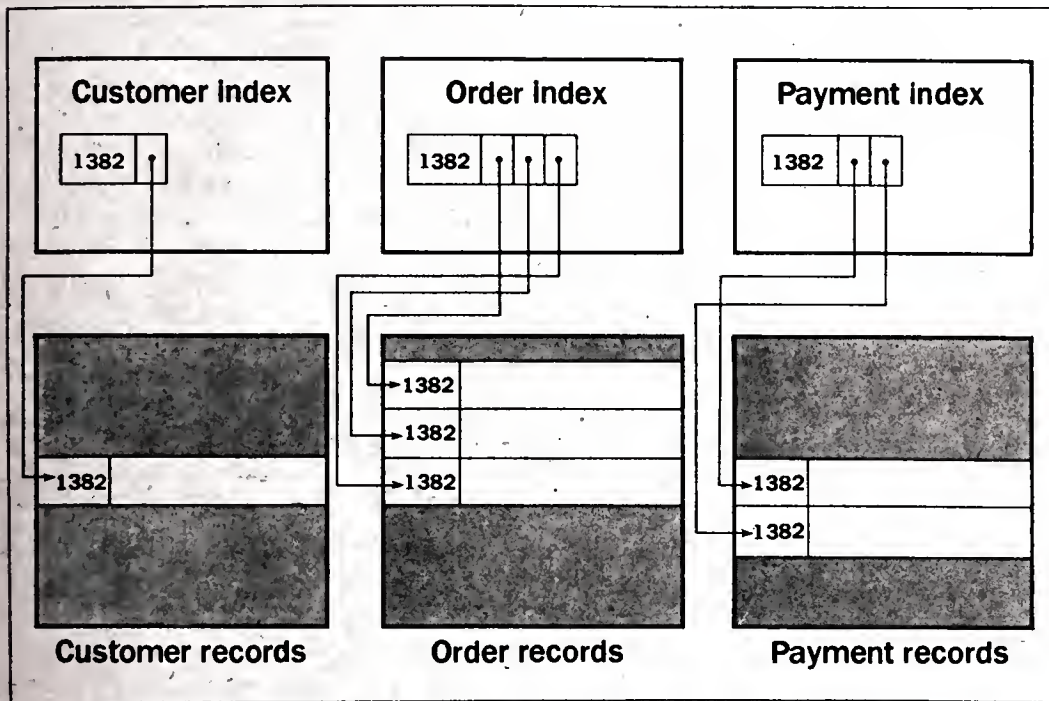


Figure 3. Separate Indexes cause redundancy and excessive I/O.

above, the combined index approach results in a DBMS architecture that can support extremely demanding applications.

The combined index has performance attributes that even exceed those of older DBMS. For instance, because each payment record is reflected in the index, a program can go directly to a desired payment record without having to locate the customer master record first and then "chase chains" throughout a disk pack in order to locate the desired payment record.

Optimum secondary access

Another performance benefit of the combined index approach is that it applies across the board to all data items the data base administrator decides to include in the index. That is, it is just as fast to find a customer based upon his name as it is to use the customer number. This setup contrasts with older DBMS in which there is one best way to enter a data base, and all secondary access paths must resort to much slower, higher overhead operations involving secondary indexes, special sets or one-of-a-kind records.

In addition, the relational DBMS permits fast entry to any indexed record. The application is not forced to read a master, root or owner record first and then navigate to the true record of interest. This is another performance improvement of relational DBMS (with a combined index architecture) over traditional DBMS.

One performance comparison between relational and older DBMS that is often not made is the speed of performing complex (compound

Boolean) selections. Older DBMS are incapable of performing these selections directly, so I/O events are needed to read records, and selections must be hard-coded into production programs. Relational DBMS allow such selections to be specified as an integral part of the data manipulation language.

As shown in Figure 4, a combined index contains all the identifiers (addresses) of records containing a particular domain value. When more than one field is used in a data base selection, the system is able to perform conjunctions across these values.

Thus, a request for all parts used in a particular assembly having current status can, with the appropriate index definitions, be answered by simply intersecting the values in the index to determine the exact set of records before doing any I/O to read the records. A similar conjunction between different domains is impossible in any predictable amount of time in a network or hierarchical DBMS because the relevant data base records are not identified in any combined index approach — thus, the records must be individually read.

This scenario makes clear that network and hierarchical DBMS have no strategy for addressing the kinds of relational processing required by today's user — and, more important, today's new class of production applications. Because no combined index exists (often fields that should appear in such an index do not appear in all applicable underlying records, so such an index cannot readily be built) the performance

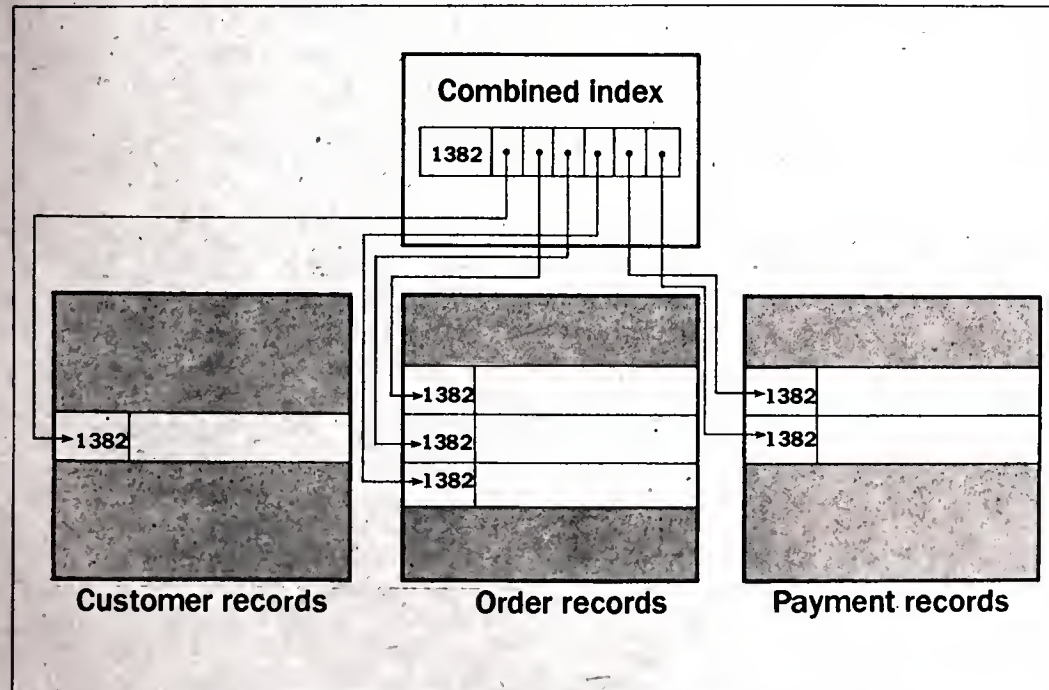


Figure 4. Combined index eliminates redundancy and I/O.

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IN DEPTH/RELATIONAL DBMS

of "logical views," which often attempt to compensate for the nonrelational structure of these DBMS, is simply not good enough for production use.

Index-only processes

Another performance achievement of relational DBMS is the delivery of index-only processing capability. Remember, the index is always hidden from the user — it is strictly an optimization tool.

But also consider the fact that index entries are data — customer numbers, order numbers, dates and so on that have been selected by the data base administrator to optimize production applications.

Often, certain production inquiries will happen to ask only for data that has been indexed. In this case, a relational system can easily return

the desired information without reading any data records. This is a function that cannot be achieved without I/O to data records in older DBMS.

Queued index balancing

One concern relative to index systems is the amount of work necessary to balance the index and optimize its performance. Some relational systems have developed asynchronous balancing techniques that permit transactions to always complete immediately.

In these cases, the relational system heuristically determines the changes in the index to improve its performance and places those changes into a queue to be processed asynchronously as a low-priority task by the DBMS nucleus. All DBMS threads in a complete multithreading

mode are allowed to run without interruption, locks or enqueues while the index structure is being changed.

This important innovation provides high-performance, nonstop index capabilities. Other index systems gradually degrade or require periodic reorganization; asynchronous balancing has none of these drawbacks.

Disk space requirements

Another common argument against relational DBMS is that the same field will be stored in more than one table, thus requiring more disk space than older DBMS. Although on the surface this appears true, actual comparisons have resulted in disk space usage being a nonissue. This can be attributed to several factors:

■ Although relational DBMS will

repeatedly store certain fields, nonrelational DBMS must compensate by storing embedded pointers with every data base record. There are often forward, backward and other kinds of pointers. These chains may take between 12 and 36 information characters per record. In most cases, a good relational data structure will use less actual disk storage.

■ Many older DBMS require that extra large amounts of disk be allocated to the data base. This allocation is necessary to accommodate randomizing routines (to ensure that not too many records will randomize to the same block, thus degrading search times) and to accommodate growth.

Relational systems that do not rely upon randomizing techniques can afford to store data more densely. They do not require the same percentage of excess free space in order to achieve fast search times or accommodate new records. Additional disk extents can be dynamically allocated when necessary to accommodate growth.

■ Older DBMS often must redundantly store data in secondary indexes or special sets in order to provide alternate access paths to the data. Relational DBMS do not need to employ these techniques and thus can support alternate access paths with less disk space.

■ In addition, some relational DBMS employ compression techniques, both for data and index areas, which significantly reduce disk space requirements.

For a given data base, the actual difference in disk storage between a relational and an older DBMS implementation will depend upon several variables: the specific DBMS being compared, the data base design, what storage options are chosen and so on. Experience has shown, however, that the differences, if any, are not a significant factor.

Multithreading techniques

Relational DBMS have included multithreading techniques to improve transaction throughput. In fact, index-based DBMS systems pioneered DBMS multithreading — a facility that was added to older DBMS as an extension.

Multithreading makes it possible for one task to proceed while another is still in process. It should be possible to multithread many DBMS operations — reads, additions, updates, deletes and rollbacks. In addition, in a good relational DBMS, the entire index is never enqueued.

Relational DBMS also have implemented sophisticated buffer management techniques, which permit index and data blocks to be reused while in memory. In a system that is multithreaded, no I/O events will be performed to read an index or a data block that is already in memory. Thus, a given block can be reused by many users.

This technique results in the DBMS automatically retaining the most active parts of the index and data base in memory. This, in turn, eliminates I/O events that otherwise would have been issued in order to access this data — I/O events that are executed in systems not using such buffer management techniques.

One important aspect of performance that is often overlooked is sequential processing. Yet sequential processing is extremely important to production applications because

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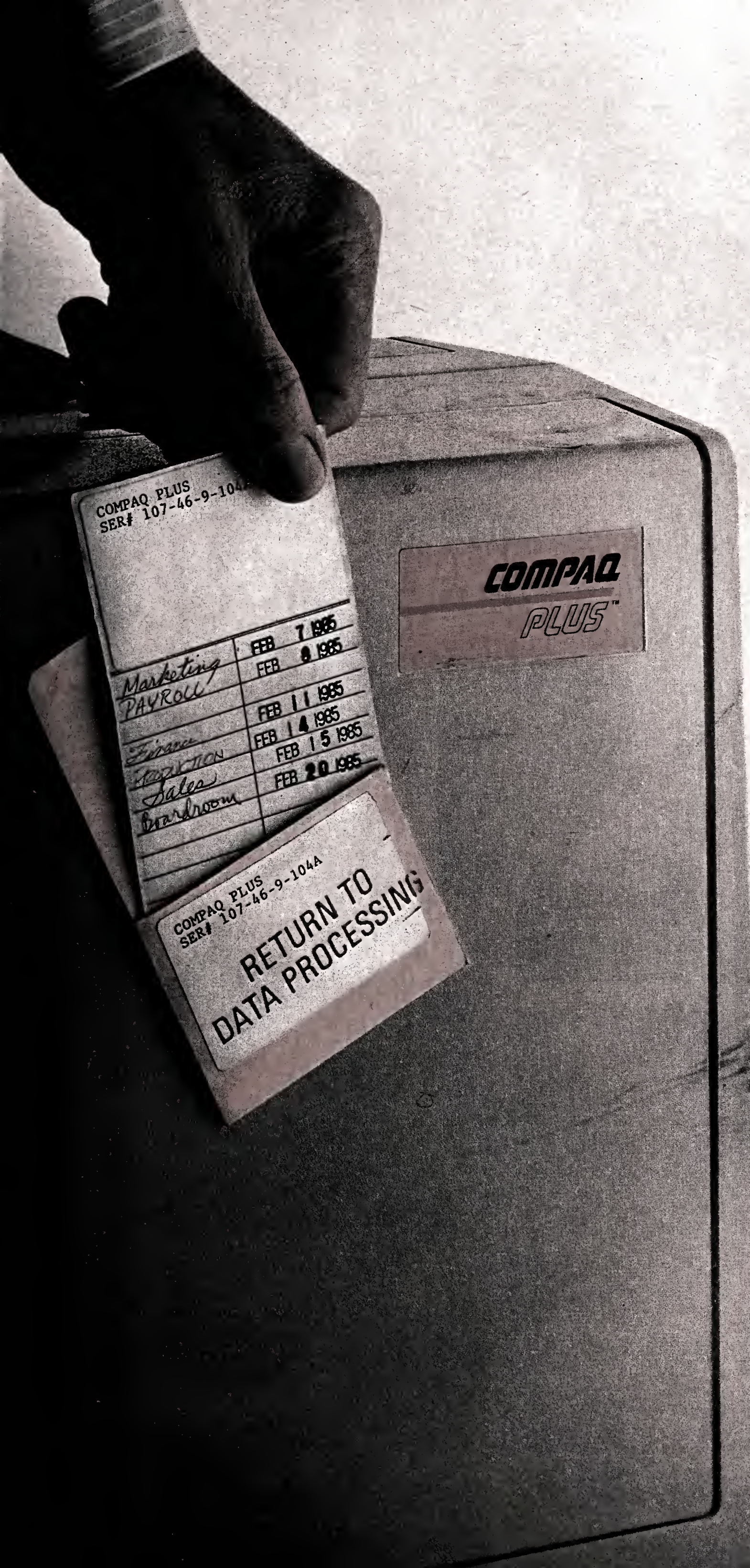
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IN DEPTH/RELATIONAL DBMS

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Although we may be able to optimize production applications, the end users will submit massive scans of the data base, which will wipe out any hope for good production performance.

there is so much of it being done. In this area, modern relational systems can beat older hierarchical and network systems hands down.

Many older DBMS store data in a hashed or random fashion. This way, records that are logically next to each other are in reality dispersed over a disk area. This is all right for random processing, but it really hurts sequential processing.

Relational DBMS, on the other hand, store data in ta-

bles. And although in relational theory the order of records in a table is unimportant, the fact is that almost always, in production applications, the records will actually be in some foreknown order. So, although a relational DBMS does not require a specific ordering of records on the disk, it is not restricted from capitalizing on this ordering if it happens to exist.

This is indeed what some relational systems do. When

a program begins to process one or more tables sequentially, the system checks to see whether the order of processing happens to match the actual order of records on disk. If it does, then the system can automatically boost performance by executing multiple-block read operations. In addition, special buffering techniques allow large amounts of data to be moved from the DBMS nucleus to the user's address space, eliminating many cross-memory service requests that are executed by older DBMS.

Sequential processing requirements do not just magically disappear when an organization implements a DBMS. And in this important sphere of DBMS performance, relational DBMS can be implemented that are significantly faster than traditional DBMS.

All-or-nothing syndrome

An unfortunate, but often unstated, pillar of the argument against the use of relational DBMS is the all-or-nothing syndrome. When confronted with all of the additional operations, flexibility and capabilities of a relational DBMS, too many have jumped to the conclusion that surely there must be no way to control the use of these additional facilities.

In other words, it's all or nothing. We're forced to live with all the possible searches and operations that any old end user may see fit to submit to the system. Although we may be able to optimize production applications, the end users will submit massive scans of the data base, which will wipe out any hope for good production performance.

Fortunately, this argument is not true today. Existing relational systems contain comprehensive administrative controls that allow performance of production applications to be protected.

However, the controls do not eliminate the power and flexibility offered to end users (in other words, end users are still able to submit the same searches and operations, in the same terms, as before).

Some systems, in order to protect production performance, actually introduce embedded pointer architecture into the data structure under the euphemism "pre-defined joins." This is not the approach to use. It effectively pours concrete over the data base design and actually inhibits productivity and prevents flexible new uses of the data involved. Also, numerous complex relational operations are no longer possible upon the modified data base structure.

Several methods exist whereby performance of



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IN DEPTH/RELATIONAL DBMS

production systems can be protected while still giving end users — and production applications, too — the full benefit of the relational DBMS.

Task priorities. Some relational DBMS are fully multithreaded for all operations. Further, some have the capability to assign priorities to different tasks within the system. It is possible, for example, to maintain very high priorities for important production jobs while support-

ing certain end-user queries with lower priorities. In this way, the system will favor production while still accepting and processing end-user queries.

If end users have a cadre of oft-repeated queries, a special task identification can be assigned to them to give them equal priority with production work. That way, only the unoptimized and unplanned requests would have a lower priority.

Anytime an organization

has more than one person or group trying to use the same computer, it must either give everyone the same priority or make trade-offs. Unplanned queries should not necessarily be given a lower priority than production work. It depends upon what is important to the individual organization.

Many who claim that relational DBMS cannot be used for practical data processing have implied that relational DBMS have no mechanism

for making distinctions in priorities — and that capability does exist in relational systems.

Operation analysis. Relational DBMS often support the ability to analyze the impact of an operation before it is attempted. For example, a relational DBMS can detect that a given query does not specify an indexed field and that it will therefore scan a table containing millions of records.

In such a situation, feed-

back can be given to the user before the search commences. The user can then restructure the query (coached by the system) to narrow the search boundaries. If the query must stand as submitted, the user can direct that it be performed in batch at night instead of on-line during the day.

User resource limits. As a refinement of the point above, a user can be assigned a predefined limit of I/O events, data records, CPU or elapsed time. This limit could vary by user.

If, in the scenario above, the user decided to submit the query on-line during a busy day (even knowing the resource implications), then the limitations established by site management will automatically prevent an unauthorized scan encompassing millions of records.

Avoiding arbitrary limits

The goal of relational DBMS must be to provide an organization with administrative tools that allow the preservation of production application performance without arbitrarily limiting the flexibility of the relational model. By imposing controls such as those described above, a relational DBMS still delivers all its benefits: The users are not prevented from asking any questions about the data base; knowledge of access paths is not strictly required; and production systems receive high priority and are not unpredictably devastated by some ad hoc query.

Where are we today in regard to relational DBMS technology? Must data processing professionals just sit, wringing their hands, waiting for the higher productivity and flexibility of the relational model or some new hardware miracle? Are relational DBMS good "only for certain things"?

Absolutely not. Just like the Roman numerals expert who is watching the emergence of a better system, so the industry today is beginning to witness the first practical high-volume implementations of the relational DBMS. Arguments put forth in this article will soon be considered self-evident, because everyone will be using relational DBMS and will be quite happy with their performance.

About the authors

Ed Millsap is a vice-president of Applied Data Research, Inc. (ADR) in Princeton, N.J., and director of the ADR/Datacom Product Group.

Ken Sloan is a divisional vice-president of ADR and manager of research and development for the ADR/Datacom Product Group.

Steve Gerrard is director of product marketing for ADR.

SCIENCE/SCOPE

Two communications satellites rescued by NASA's space shuttle in November are being refurbished to be launched again. The spacecraft were brought back to Earth after shooting into wayward orbits nine months earlier when their rocket motors misfired. Spacecraft controllers at Hughes Aircraft Company spent months taming the satellites and bringing them into orbits low enough that they could be reached by the shuttle. Their efforts were the most sophisticated series of orbital maneuvers ever attempted. In addition, Hughes and NASA engineers worked tirelessly to develop hardware that permitted the actual recovery. The satellites emerged in good condition. Most of the electronics were never turned on, but certain items—batteries, thermal blankets, and thrusters—are being replaced.

Pilots of future aircraft may rely on artificial intelligence systems to help them assess combat situations and take appropriate offensive or defensive actions. Hughes engineers are conducting studies for the U.S. Air Force on potential uses of artificial intelligence for fire control and battle management. One focus is how to identify targets automatically and present this information for a pilot's use. Another aspect involves tactical analysis, including decision-making that advises a pilot whether to attack, flee, apply electronic countermeasures, or fly low-altitude routes. New automation techniques may be necessary for pilots to cope with the fire control systems now being designed for the next generation of military aircraft.

The feasibility of turning sea water into electricity is being studied in fusion energy experiments at Kyoto University in Japan. The studies involve a Hughes gyrotron, a microwave tube that uses a spiraling stream of electrons to produce extremely high power microwave frequencies. Fusion energy holds tremendous potential because its source of fuel (hydrogen) can be extracted from sea water. It could produce large amounts of power with little or no radioactive waste and no threat of meltdown or explosion. In fusion energy research, the gyrotron's high-power radio waves heat hydrogen particles (plasma) to temperatures of tens of millions of degrees. These particles fuse under pressure, causing a thermonuclear reaction that provides energy for driving steam turbines.

A new 5-volt-only, 256-bit nonvolatile random access memory combines the data retention capabilities of an EEPROM with the convenience of a CMOS RAM. The Hughes circuit, designated H13500, is designed for such applications as reconfigurable systems and fault protection without battery back-up. It is organized as 64x4 bits. Both the read and write operations are performed as in a standard CMOS RAM. A single store operation transfers all data in the RAM cells in parallel to the background EEPROM array. The recall operation restores data in parallel to foreground RAM cells.

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IN DEPTH



Scene: Monthly project review meeting. The project manager is reviewing cost-to-date and estimate-to-complete figures when the financial analyst interrupts: "Why should anyone believe your estimates when the cost to date bears no resemblance to the cost accounts?"

How to account for project planning

By Arthur Buonamano and Robert Jones

Cost discrepancies haunt a wide variety of companies involved in projects. The problem is distressing — both to project managers and those responsible for finance.

The frustrating scene above should alert both managers to an ongoing problem affecting their functions. Resolving the situation can also be frustrating: The project manager and financial analyst must isolate their differences by painstakingly — manually — reconciling all costs to date with the plan records. This continuing exercise can absorb far too much of a project manager's time. It is particularly dangerous because his attention focuses on the past, not the future. The result can be a smooth project review meeting but bad estimate to complete.

One solution is an integration of project management and accounting. The integration process assumes that you start with two points of view:

- The planning control view.
- The accounting view.

Both views may be supported by an automated system. Generally, each view has a structure reflecting the in-

Integrating project management and accounting means linking the two systems (and viewpoints) so that reconciliations and disagreements over cost to date are eliminated.

formational requirements of its function. For example, a project management (or planning) system will have a project-phase-task hierarchy related to resources. An accounting system will be based on a general ledger hierarchy and will be concerned with expenditures.

The informational lowest common denominator between these two views, in all likelihood, is the project level. Below that, no common information is available. In fact, some accounting systems do not have a project hierarchy level at all.

In basic terms, therefore, integrating project management and accounting can be described as linking the two systems (and viewpoints) so that reconciliations and disagreements over cost to date are eliminated.

Why integrate?

The scenarios above indicate why you should integrate:

- To save project management and accounting time.
- To focus on the future.
- To improve estimates of cost to complete.
- To improve communication between project management and financial management.

The success of any program depends, in part, on the clarity with which its objectives are stated. Before investing too much effort in an integration project, top management ought to decide on objectives. The following three should be included:

Initiate cost entries to one system, which will then feed the other. This

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IN DEPTH/PROJECT PLANNING

objective addresses both the inefficiency of two systems of collecting actual cost data and the exposure to reconciling items when two systems are recording the same economic events. The product is one "labor ticket" only — not one for the accounting system and one for the project manager.

Most useful areas

Of course, labor is only one source of cost on most engineering or construction projects. Accounting integration is most needed and most useful in those environments in which vendor charges, corporate cross-charges, internal labor, internal inventory relief and other sources of accumulating costs are all available to the project manager.

If one entry is going to drive two systems, the planning and the ac-

counting system, then the system with the most discrete data informational need should be the driver or feeder to the system with the less discrete need. In general, therefore, it will be the planning system, with its precise tasks, that will drive the accounting system, with its more global discriminations. This leads to the second objective:

Let the project planner determine the basis for classifying actuals against project tasks.

This objective simply means that

”

Given a working planning system and a working accounting system, there will be great resistance to making radical changes to either.

the planner should be able to describe his plan in terms of tasks and milestones meaningful for operational management of the project. Within the project, the planner should be able to determine his own "chart of accounts."

Make the project plan system (which has the actual cost data applied to it) become a subsidiary ledger of the company. That is, make it the source of authoritative accounting costs on projects.

When these three objectives are met, an accounting integration is achieved. Meeting these objectives generally involves an administrative and MIS project. A look at the constraints that bound the design possibilities will reveal the scope of such a project.

Design constraints

Given a working planning system and a working accounting system, there will be great resistance to making radical changes to either. This is particularly true if either or both is a vendor-supplied package. In fact, if either is vendor-supplied, there may be license limitations that preclude any changes to the system at all.

A related constraint has to do with the existing information flows. For example, it is unlikely that major changes can be introduced into corporate purchasing, accounts payable, raw materials inventory and corporate cross-charge systems and procedures to enhance an engineering department's planning and control system.

This limitation, of course, will vary from company to company and industry to industry.

Given the objectives and the framework of constraints, we can progress to a set of design considerations and decisions. The most important relates to the basic flow of information between the planning systems and the general ledger. Essentially, there are three possibilities:

- The planning system collects actual cost data, which is summarized for posting to the general ledger.

- The general ledger collects the cost data, retaining sufficient detail to pass it to the planning system.

- A collection system assembles all cost data and routes it to both systems.

IN DEPTH/PROJECT PLANNING

The first method most naturally will meet the objective of allowing the planning system to be the authoritative source of accounting data on projects.

However, the other approaches can be considered as a possible solution if sufficient controls are designed into the systems and procedures. The first approach is clearly the best if you consider the following arguments pertinent to your company:

A prime reason for integrating is to eliminate differences between the planning system actuals and the accounting system actuals. Since the planning system is the more demanding validity screen, it makes sense that only transactions that have passed through the planning system are posted to the general ledger. Any invalid charges will be trapped between the systems. Suspended items trapped between systems would result in reconciling items and communications problems — exactly what integration is attempting to avoid.

Because the above argument would apply to most cases of integration, the first design alternative is the preferred approach and will be assumed for the remainder of the article.

Requirements analysis

The functional requirements of the integration should be developed by both planning and accounting representatives. However, the objectives and constraints essentially preserve the full functionality of the planning system and related conventions.

It is the accounting world that needs to specify requirements so that accounting integrity and ability to audit will be maintained. Some key areas of concern are the following:

Suspended (error) item processing. Any cost transactions that are rejected from the planning system need to be detailed for correction activities. The cost involved needs to be held in a suspense account on the ledger. Accounting and reporting procedures must be adopted to handle the new suspense account.

Accounting controls. The planning system, now that it will become an accounting system as well, must be subject to vigorous controls, including run-to-run controls, month-to-month controls and ledger tie-outs.

In this context, a run-to-run control means that the dollars sent to the planning system must be shown to equal the dollars posted to the general ledger from the system plus or minus the effects of suspended-item dollars.

A month-to-month (or week-to-week) tie-out will

involve checking that cost to date on the planning system at the prior month-end plus current month activity on the planning system equals current cost to date.

Project cost to date (or current-year costs for period-costed projects) from the planning system must be agreed to account balances in the general ledger.

Labor costing requirements. Most planning tools will cost (extend) labor hours or days that are

passed to them by applying a labor rate from a rate file. It may therefore be necessary to suppress the action of this costing and permit the corporate labor costing calculations to be passed to the project planning system. This would be necessary if the planning system permitted only one actual rate per individual when in fact a burdened or an unburdened rate might both be appropriate to the same individual, depending upon the nature of the

projects he was charging.

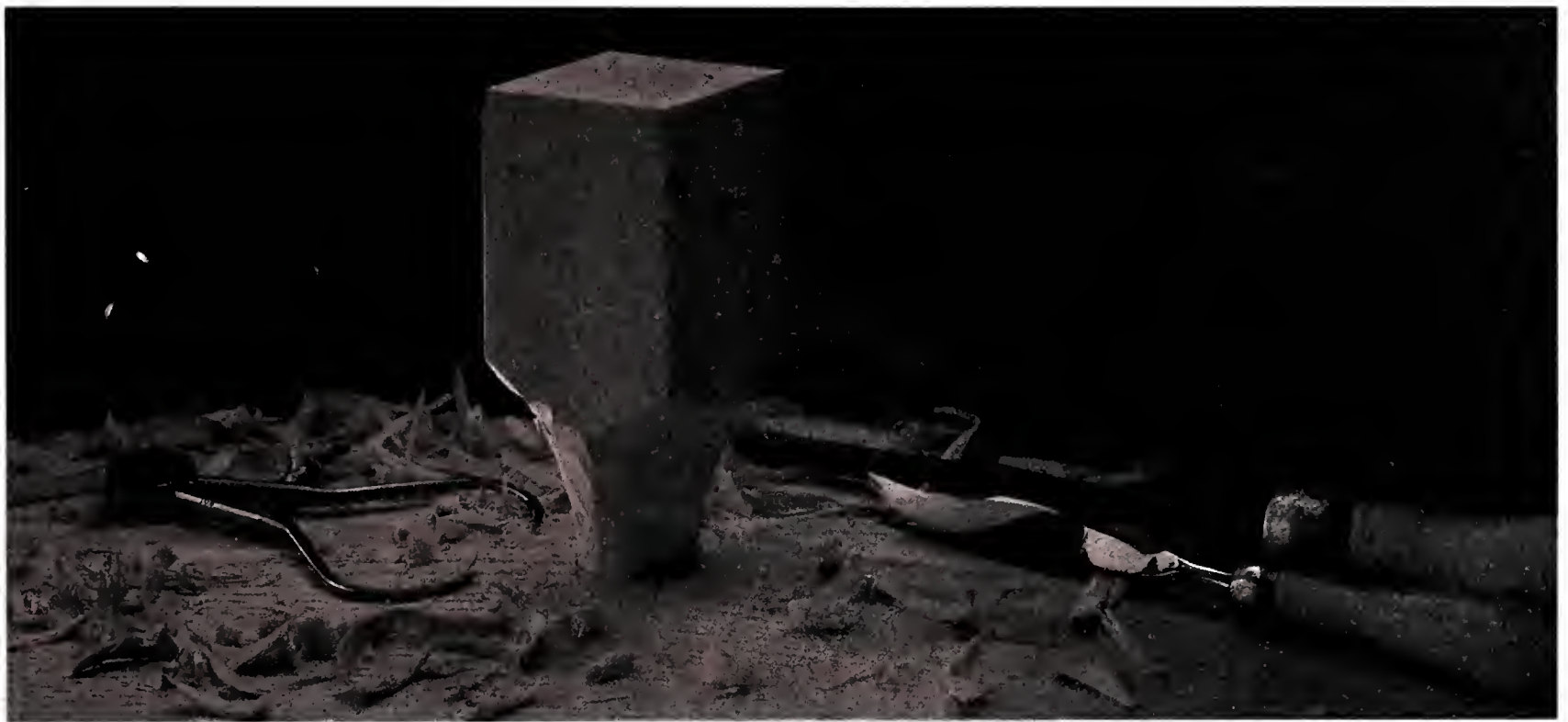
Audit trail. Most planning systems do not retain transaction history or do not retain it in a form suitable for management or audit trails. It may be necessary to specify the need for additional software to maintain such a file.

Even if the planning system has such a file, it will not likely carry feeder system data such as voucher numbers, storeroom designators, labor week-ending

dates and so forth.

Project cross-reference files. Because the purchasing or accounts payable systems (or other cost transaction feeder systems) may not recognize the coding conventions of the project planning system, automated cross-referencing may be required to translate an account number-based charge into a project-phase-activity code charge to the planning system.

After these and perhaps other requirements are



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COMMUNICATIONS

VOICE/DATA COMMUNICATIONS

■ **Micom Systems, Inc.** has introduced **Micro7400i IBM Gateway Module** that allows terminals on a **Micom Micro600 Data Private Branch Exchange Network** to access IBM hosts.

The product reportedly lets asynchronous devices emulate Systems Network Architecture, Synchronous Data Link Control or bisynchronous devices. Network devices can appear as IBM 3278 or 3279 terminals or an IBM 3287 printer. It reportedly supports 16 users and features a command port for keyboard configuration of the gateway, automatic login to a host application, password protection and automatic host logoff.

An eight-user version of the gateway costs \$3,600, and a 16-user model sells for \$5,400.

Micom Systems, 4100 Los Angeles Ave., Simi Valley, Calif. 93063.

■ **Emerald Technology Group, Inc.** has announced two communications expansion devices for IBM's **System/34, 36 and 38**.

Multiliner DP280 enables one synchronous port to support up to eight switched or dedicated lines at speeds up to 19.2K bit/sec. This product, which supports Systems Network Architecture and bisynchronous protocols, may be used as a remote concentrator.

Multiliner DP280 costs \$1,595; **Remote Multiliner** is priced at \$1,795.

Emerald Technology Group, Suite 102, 1601 116 Ave. N.E., Bellevue, Wash. 98004.

PROTOCOL CONVERTERS

■ **Innovative Electronics, Inc.** has announced **MC 80/700**, a protocol conversion unit that provides IBM 3287 printer emulation.

The product is said to be linked to an IBM 3274 or 3276 controller through a Type A coaxial cable.

A spokesman said that **MC 80/700** runs under bisynchronous, Systems Network Architecture and Synchronous Data Link Control protocols. Output can be formatted with 40, 64 or 80 char./line or in an unformatted mode with 132 char./line.

MC 80/700 costs \$1,495.

Innovative Electronics, 4714 N.W. 165th St., Miami, Fla. 33014.

SOFTWARE

■ **VM Personal Computing, Inc.** has released **Version 2.1 of Relay/3270**, an asynchronous communications package that runs under IBM's **VM/CMS operating environment**.

A spokesman said that the enhancements compare old and new screens and pass only changed portions. The product, when coupled

with the company's **Relay communications software** for the IBM Personal Computer and compatibles provides IBM 3278 and 3279 terminal emulation and file transfer capabilities.

Relay/3270 costs \$6,995.

VM Personal Computing, 475 Fifth Ave., New York, N.Y. 10017.

AUXILIARY EQUIPMENT

■ **Votrax, Inc.** has announced the **Dual Tone Multifrequency (DTMF) modem**, which enables **Votrax' LVM Communicators** to synthesize **Touch-Tone telephone signals** into voice output.

DTMF can be used for order entry, inventory status, cash management, directory assistance, insurance quotes and paging systems. The product costs \$700.

Votrax, 1394 Rankin, Troy, Mich. 48063.

PROCESSOR from page 77

office environment, is said to provide applications switching and routing functions, polling to save line overhead, improved error control and recovery and the ability to support multiple types of communications facilities including X.25 packet networks and satellite links.

Depending on loading, a 5620 could be configured to support — through terminal controllers — up to 300 or 500 terminals, according to **Rene E. Van der Haeghen**, manager of product management.

A two-line 5620 with the main processor, 1M byte of memory and integrated disk costs roughly \$22,000, **Van der Haeghen** said. A full system capable of supporting two hosts and 32 lines, with 2M bytes of main memory and the integrated disk, costs \$54,000. It is scheduled to be available in the fourth quarter.

The **Comten Network Gateway (CNG)** is a software package that runs on the company's 3600 family of communications processors and reportedly enables up to eight independent SNA networks to be interconnected. **CNG** runs on **Comten**

processors under **Comten Communications Operating System Release 3** or above and **Comten's Advanced Communication Function/Network Control Program (ACF/NCP) Release 3E**. It supports communications with other **Comten** processors and IBM 3705 and 3725 front ends.

The **CNG** automatically translates addresses that it passes from one NCP to another and accepts, processes and translates SNA commands to establish and terminate sessions between interconnected networks, the company reported. **CNG** only supports sessions with hosts that support IBM's **Multiple Systems Network Facility**. No host software changes are said to be needed. The initial license fee for **CNG** is \$2,200, and monthly fees are \$400. It will be available in the second quarter.

NCR Comten also announced the release of the **Comten Advanced Communications System** for **NCR hosts (NCR/ACS)**. This product can be installed in a **Comten 3600** communications processor to make that system compatible with **NCR's 8500 and 8600 VRX processors** while retaining IBM host support.

A 3600 series **Comten** front end

with **NCR/ACS** reportedly enables users to share IBM and NCR host applications between terminals, which is said to reduce line costs and eliminate terminal duplication.

NCR/ACS is composed of hardware and multiple software components with a combined initial cost of just over \$11,000 and monthly software license fees of \$550. It is scheduled for delivery in the second quarter.

Finally, **NCR Comten** said that it is now selling the **2200 Matrix Switch**, a

product manufactured by **Dynatek**. A maximally configured switch has 512 input ports and 512 output ports and can be used in front of multiple communications processors to configure or reconfigure the routing of lines into these processors.

The switch costs \$300 to \$380 per pair of ports. The smallest configuration would probably be roughly a 64-by-64-port model, the company said.

NCR Comten is located at 2700 Snelling Ave. N., St. Paul, Minn., 55113.



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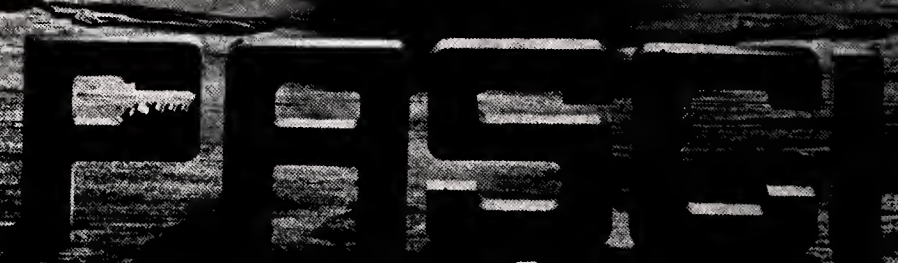
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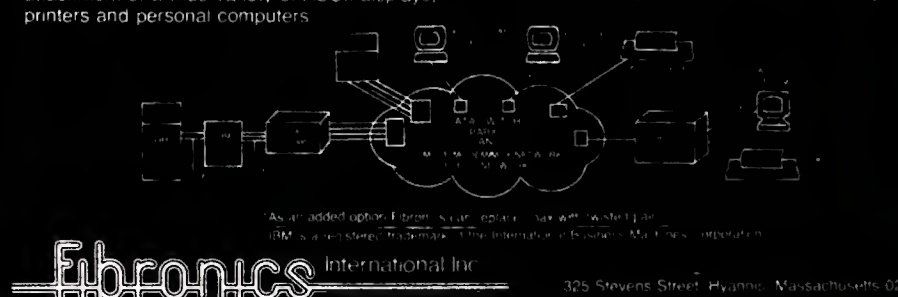
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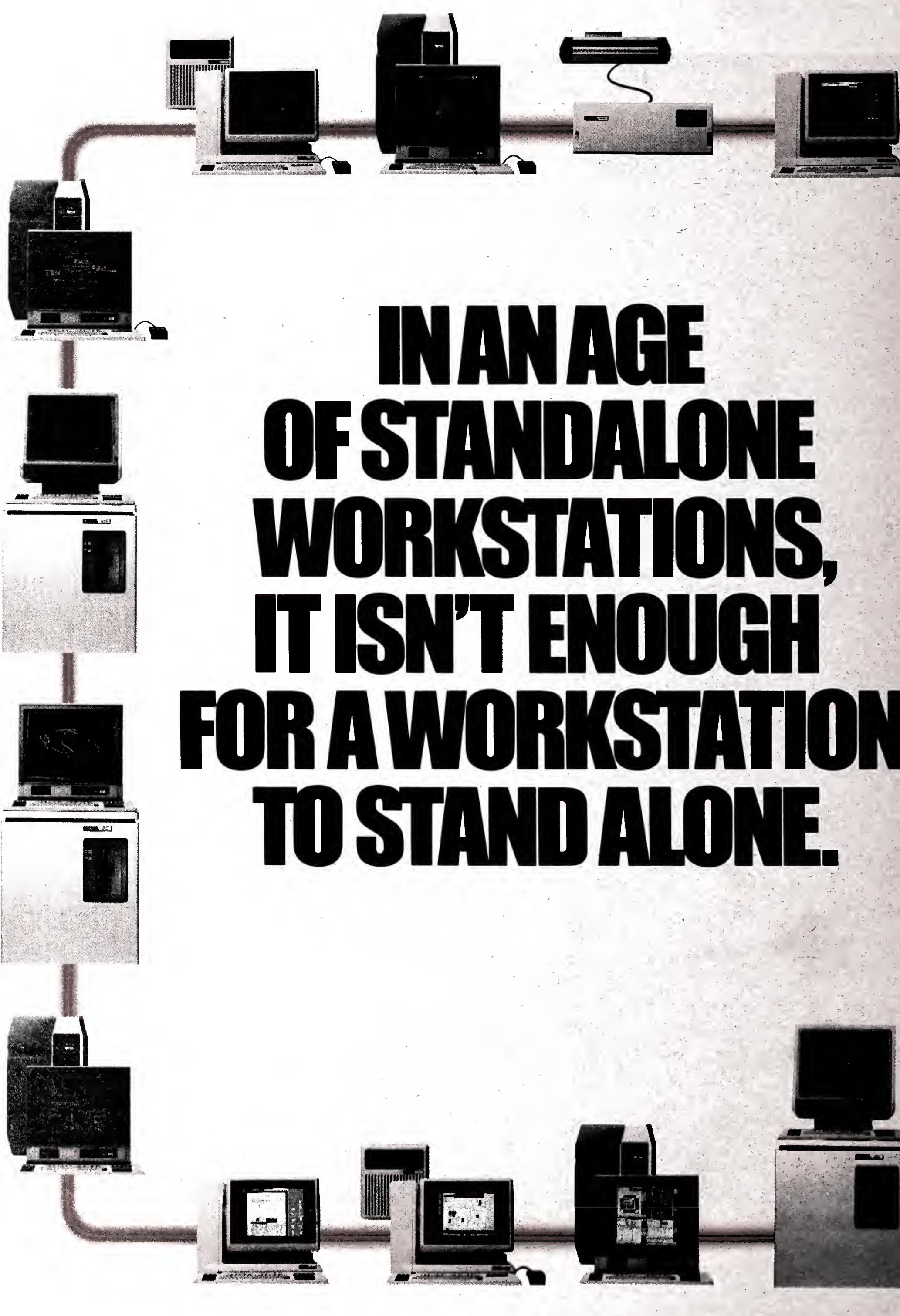
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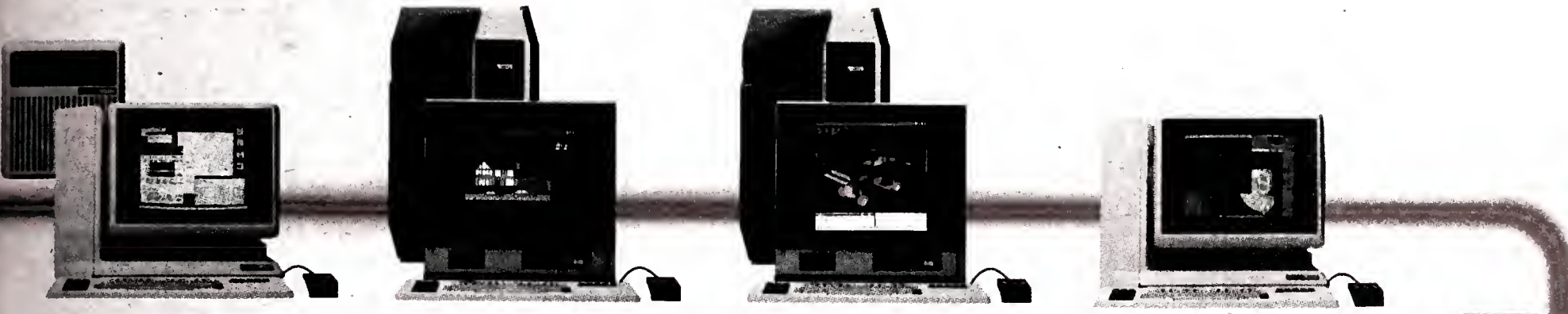
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FOR A WORKSTATION
TO STAND ALONE.**



It's a well-accepted dictum that the bigger the technical problem, the more compute power needed to solve it. A valid reason for engineers and scientists to demand their own standalone computers and the processing power that comes with them.

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One computer company has successfully solved this apparent dilemma. Apollo. Instead of simply building standalone computers, we've engineered DOMAIN[®] processing. A computing environment that adheres to our belief that both processing power and the ability to share that power are equally important in measuring a computer system's true value.

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workstations without isolation from co-workers and their data.

DOMAIN processing also delivers something else uncommon to standalone computers. A family of compatible workstations. They range from high performance color units for demanding applications such as solids modeling to monochromatic workstations for applications like software engineering.

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While these facts no doubt attest to the efficacy of DOMAIN processing, it's also reassuring to know that the DOMAIN network even connects to other computer systems via industry standard protocols such as X.25 and ETHERNET[®]. Of course DOMAIN supports the UNIX[®] software environment as well.

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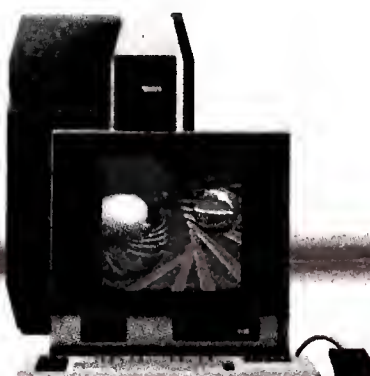
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COMMUNICATIONS

MODEM from page 77

point-to-point applications. The new 7165 is said to combine the capabilities of the current 7165-0100 and 7165-0200 9.6K bit/sec modem for point-to-point and multipoint network configurations into one unit. The 7165 can be reconfigured with a front panel switch.

Prices for the 7164 series start at \$3,700, and prices for the 7165 start at \$5,800 in single quantities. Quantity discounts are available.

A fan-out option for both modems — essentially enabling up to four terminal devices to share a remote modem — costs \$750. A multiplexer option for the 7165 costs \$870.

All new models are reportedly available now. The company is located at 2700 Snelling Ave. N., St. Paul, Minn. 55113.

VISA from page 77

"We selected Compuserve because . . . [it] was willing to give us private ports on its access points at competitive prices," Castleberry noted. Having a private or dedicated access port is comparable to having a reserved space in a crowded parking lot, he added.

"One advantage is that the merchants don't have to compete with Compuserve subscribers to access the network," Castleberry said. "Another is that the POS terminals, which are made for Visa by various manufacturers, don't have to be reprogrammed or retrofitted in order to access the Compuserve network."

In addition to establishing private ports for Visa on selected access points, Compuserve altered its network software to streamline the POS

operations. The changes provided routing to multiple Visa host computers, decreased the response time and eliminated some of the steps commonly required in using a dial-up net-

”

*More than 5,000
POS terminals in
more than 100
markets operate
through the Com-
puserve network.*

work, such as entering a user ID number and password.

According to Castleberry, the system works in the following manner:

To obtain approval, a merchant enters the amount of the purchase and passes the credit card through a special POS computer terminal that reads the magnetic stripe on the back of the card. The terminal automatically dials either the Compuserve network or a computer at the merchant's bank, both of which are linked to Visa's own network.

Through electronic routing, the card is checked against computer records of lost and stolen cards — records provided by the bank that issued the card. The response — approval or decline of the purchase — is immediately transmitted back to the merchant's terminal. Criteria for authorization are established by the card-issuing bank; for example, authorization may be denied because the cardholder is over the credit limit.

Slower system replaced

The new system replaced a slower method of authorization. In the other system, merchants either called or checked the card number against a printed bulletin of lost and stolen cards. The process took at least two minutes to complete.

"Electronic authorization greatly reduces the chances that a bad card will be approved," Castleberry said. "First, reports of stolen cards are entered by the Visa member bank into the computer system immediately, whereas a bulletin is updated only once every 10 days. And because a terminal reads the magnetic stripe rather than an embossed card number, altered cards can be detected."

The Visa-Compuserve pilot project was tested in 50 markets. Currently, more than 5,000 POS terminals in more than 100 markets operate through the Compuserve network.

Feature being tested

A feature being tested on special POS terminals is data capture, or storage of the credit card transactions in the merchant's terminal, according to Castleberry.

"Currently, the merchants collect paper slips from credit card transactions, add them up and send them to the bank for credit to their accounts," Castleberry said. "That process can take seven to 10 days. With electronic data capture, the transactions could be transmitted to the bank within hours."

"The entire process, involving the merchant, the merchant's bank and the card-issuing bank, can be completed within one or two days," he said.

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April 10	Boston: Marriott — Newton
April 12	Washington D.C.: Stouffers Concourse Hotel — Arlington
April 16	Detroit: Pontchartrain Hotel
April 18	Toronto: Park Plaza Hotel
April 24	Chicago: Westin — O'Hare

Seminar Agenda

8:30-9:00 a.m.	Registration and Continental Breakfast
9:00-9:15	Welcome
9:15-9:45	Personal Computing 1985: User Presentation on Recent Trends in Corporate Personal Computing
9:45-11:00	Spreadsheets and Financial Modeling for Organizational Productivity: Using Lotus 1-2-3™ and IFPS/Personal™
11:00-11:30	Managing Spreadsheets and Financial Models: A Case Study
11:30-12:00 noon	EXECUCOM: Meeting the Challenge of Productive Organizations

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"The book I'm writing is titled *Transistors, Volume 1.*"

SYSTEMS & PERIPHERALS

Vaxstation 500 out

DEC offers CAD, modeling graphics

MAYNARD, Mass. — Digital Equipment Corp. has introduced Vaxstation 500, a graphics workstation designed for computer-aided design, cartography, molecular modeling and research applications.

The product consists of a DEC Microvax I supermicrocomputer and the newly released Tektronix, Inc. 4125 color terminal. A basic system features 1M byte of random-access memory, two 400K-byte floppy disk drives, a 31M-byte hard disk, DEC's Microvms operating system and a graphics subsystem, the vendor said. Vaxstation 500 can be linked with other VAX computers through Decnet or Ethernet local-area networks.

The graphics subsystem consists of a 19-in. color monitor, Intel Corp. 80286 and 80287 microprocessors, 256K bytes of display list memory, a 16-million color palette and a keyboard. The terminal can simultaneously display 256 colors and has a resolution of 1,280 by 1,024 pixels, the vendor said. The terminal employs convergence correction techniques to maintain a convergence accuracy of 0.3mm over the display area.

Options include a three-dimensional-wire-frame option that allows a user to pan, zoom, rotate or replicate an object. A solid shading feature supports hidden lines, surface removal and up to 16 translucency patterns. A user can work with up to 1,024 colors when shading an object.

Vaxstation 500 costs \$36,735, and the graphics subsystem is available for \$19,950.

DEC is located at 146 Main St., Maynard, Mass. 01754.

Accel introduces data base sorter

SAN DIEGO — Accel Technologies, Inc. has unwrapped a sorting unit designed to accelerate data base sort-intensive operations at speeds in excess of 1M byte/sec. The Data Base Accelerator (DBA) 1000 works by off-loading a host computer's data sequencing overhead.

The peripheral processor — priced in the \$23,000 to \$51,000 range — serves a single host or a network of hosts via the Ethernet local-area network and is said to be initially targeted to Digital Equipment Corp. and Data General Corp. superminicomputers in the \$100,000 to \$200,000 range with software data base packages in the \$25,000 to \$50,000 range.

In benchmark tests against an unloaded DG Eclipse MV/8000 superminicomputer with 2M bytes of random-access memory and 200M bytes of disk storage, the company claims the DBA 1000 performed a sort in 10 to 20 seconds vs. the DG supermini, which took 12 to 16 minutes. The benchmark test was run with a simulated 18,000 item, 4.6M-byte typical inventory file, consisting of 260-byte records sorted across three fields: part number, vendor and purchase date.

The machine is said to manipulate data in much the same way that a floating-point processor manipulates numbers. The unit consists of a front-end processor, memory control unit and from one to five self-sorting memory modules. It receives data from the Ethernet local-area network, passes it on to the sorting system,

See **SORTER** page 87

■ McDonnell Douglas Computer Systems Co. has announced two systems aimed at users of Microdata Corp.'s Reality data base management system/84

INSIDE

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Terminals/84

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Board-Level
Devices/84

Auxiliary
Equipment/87

HP laser printer provides IBM mainframe link

PALO ALTO, Calif. — Hewlett-Packard Co. has announced a laser printer subsystem that links its HP 2680A laser printer with IBM mainframes. The subsystem can be used as an IBM 3211 printer replacement.

A spokesman said the subsystem, called HP 2689A, prints at 45 page/min, or 3,000 line/min, using 8½- by 11-in. paper. Paper sizes ranging from 3- by 6½-in. to 11.7- by 17-in. can also be used.

Other printer features include the use of electronic forms and signatures and multiple character fonts. Electronic forms can be designed off-line and transferred to

the controller via a 3½-in. floppy disk.

The 2689A can be used with IBM's 370, 4300 and 30 series mainframe block multiplex channels. The subsystem's hardware interface provides interpretation of channel commands, status request information and transmission of status information. Print data is formatted and merged with the appropriate form for printing. A control program running on the device controller correctly formats the data for printing on the laser printer.

The 2689A is intended for use in applications requiring 100,000 to 800,000 page/month. For outputs exceeding 800,000

page/month, multiple HP 2689As can be added to the mainframe.

Ascii, foreign language fonts

Standard environment files specifying character fonts, forms and vertical forms control commands are provided with the 2689A. Each environment file contains Ascii and foreign language character fonts, as well as horizontal and vertical print orientation.

The HP 2689A laser printer subsystem costs \$99,950.

HP is located at 1820 Embarcadero Road, Palo Alto, Calif. 94303.

Can Amdahl continue to cut prices and not cut profits?



HARD TALK

Tom Henkel
CW Senior Editor

Amdahl Corp. was first to respond to IBM's recent 3090 mainframe and 3380 disk drive announcements by cutting purchase prices 6% to 12% on its 580 series mainframes, 20% on special configurations of its 6380 disk drives and 23% on main memory.

If Amdahl's move smacks of deja vu, you're right. The company, along with National Advanced Systems Corp. (NAS), made almost identical price cuts less than six months ago [CW, Sept. 10] in reaction to IBM's price cuts on the 3080 mainframes and 3380 disk drives [CW, Sept. 3].

Swift action is an admirable trait, but you have to wonder how long Amdahl can keep it up and still turn

a profit.

To realize the impact IBM's aggressive mainframe pricing is having on compatible vendors, one must look beyond the percentages and talk about dollars.

In March 1984, an Amdahl 5880

by \$1.07 million in the past six months.

Even more interesting is the fact that International Data Corp., a Framingham, Mass., market research firm, contends that Amdahl has only recently begun shipping its

”

Amdahl twice has been forced to lower significantly the price on its 5880 before the machine ever hit the street in volume shipments.

processor with 64M bytes of main memory and 48 I/O channels cost \$5.66 million. On Sept. 5, Amdahl cut that price to \$5.04 million. Two weeks ago, the 5880 purchase price was cut to \$4.59 million. That means Amdahl has been forced to shave the purchase price of its 5880 CPU

5880 systems. That means Amdahl twice has been forced to lower significantly the price on its 5880 before the machine ever hit the street in volume shipments.

Similar cuts for other 5880s

Other members of the 5880 line

have experienced similar cuts. For example, a 5860 processor with 32M bytes of main memory and 24 I/O channels listed for \$3.04 million in March 1984.

That price was lowered to \$2.69 million in September and \$2.48 million last month. In all, the purchase price was cut by \$560,000. Likewise, a 5840 processor that listed for \$2 million last March was cut to \$1.7 million in September and now costs \$1.55 million — a \$450,000 price cut.

In this round of price reductions, Amdahl took a more subtle approach to lowering the purchase price and maintenance charges on its 6380 disk subsystem — its answer to IBM's 3380.

Instead of announcing a price cut per se, Amdahl unveiled the 6380 Model M4. The unit appears to be virtually identical to the 6380 Model B4 but costs \$9,700 less.

See **CUTS** page 87

SYSTEMS & PERIPHERALS

PROCESSORS

■ **McDonnell Douglas Computer Systems Co.** has announced two computer systems series designed to make the Microdata Corp. Reality data base management system more readily available to small businesses or large business branch departments.

The Microdata 6500 has 512K bytes of memory, upgradable to a maximum of 1M byte. The system offers disk storage from 40M bytes to 640M bytes. The Microdata 6300 features modular memory growth from 256K bytes to 1M byte of main memory and from 40M to 120M bytes of disk storage capacity. Both series systems incorporate an asynchronous communications capability that permits up to eight terminals to be

connected via a single cable.

Prices for the 6500 series range from \$38,800 to \$110,000, depending on the system's configuration, and prices for the 6300 series range from \$23,500 to \$60,000, depending on configuration.

McDonnell Douglas Computer Systems, 17481 Red Hill Ave., Irvine, Calif. 92741.

TERMINALS

■ **Texas Instruments, Inc.** has announced two additions to its Silent 700 series of portable terminals, the Model 703 receive-only (RO) and the Model 707 RO terminals.

The Model 703 RO was designed for direct connection to a host via a 300 bit/sec RS-232C interface. The

Model 707 RO can be plugged into telephone and ac outlets. The Model 707 RO is Bell 103-compatible and features a direct-connect interface, an integral modem, an on-line switch and an autoanswer modem.

TI's suggested price is \$495 for the Model 703 RO and \$595 for the Model 707 RO.

Texas Instruments, Data Systems Group, P. O. Box 809063, Dallas, Texas 75350.

POWER SUPPLIES

■ **General Power Systems** has added a 2 kVA standby uninterruptible power supply (UPS) to its Memoryguard II series of UPS for customers using minicomputers and microcomputers.

Model 2K126R features 115V and 60 cycles; Model 2K236R provides users with 230V and 60 cycles; Model 2K125R features 115V and 50 cycles; model 2K235R provides 230V and 50 cycles. All four units have eight minutes of battery back-up time. The units will be available in mid-March. The 2 kVA UPS are priced starting at \$1,995.

General Power Systems, 1400 N. Baxter St., Anaheim, Calif. 92806.

■ **Solidstate Controls, Inc.** has released the Powerbase 1000 line of uninterruptible power supply (UPS) units for use with all sizes of computer systems.

The Powerbase 1000 UPS comes in 750 VA, 1.5 kVA and 3.0 kVA sizes. The units are said to protect against blackouts, brownouts, electrical noise, voltage transients, voltage instability and frequency deviation.

Prices are \$2,500 for the 750 VA model, \$5,100 for the 1.5 kVA unit and \$6,200 for the 3.0 kVA model.

Solidstate Controls, P.O. Box 1216, Columbus, Ohio 43216.

■ **Pulizzi Engineering, Inc.** has added a three-phase, four-pole, five-wire grounding power controller to its Z-Line power controller series for use in disk drive systems that use three disk drives or more.

The Power Controller 881 (PC 881) 120/180 Vac, 30A unit includes electromagnetic interference and radio-frequency interference filters and multistage spike and surge suppression. There are three switch receptacles allotted per phase as well as one utility outlet. The unit has four filtered sequenced power remote I/O control bus connectors on the front panel that are activated with a local/remote on-off switch.

The price of the PC 881 is \$1,200.

Pulizzi Engineering, 3260 S. Susan St., Santa Ana, Calif. 92704.

BOARD-LEVEL DEVICES

■ **Network Systems Corp.** has introduced two microprocessor-based interface boards designed for minicomputers and workstations on Network Systems' Hyperchannel or Hyperbus networks.

Each Intelligent PI board contains Network Systems' Network Executive (Netex) software, which allows the system to function as a coprocessor that performs data communications tasks between different types of systems supported by Network Systems. The software facilitates such applications as file transfer, job transfer and transaction processing in either single or multivendor environments on a real-time basis. The price of the boards starts at \$6,000.

Network Systems, 7600 Boone Ave. N., Minneapolis, Minn. 55428.

■ **Augat, Inc.** has introduced its Unilayer II board, which is compatible with Intel Corp.'s Multibus.

The Unilayer II board can accommodate up to 144 16-pin dual in-line package equivalents. The I/O supports a general header area accommodating 222 I/O connections in addition to the Multibus standard P1 and P2 edge connectors.

Continued on page 87



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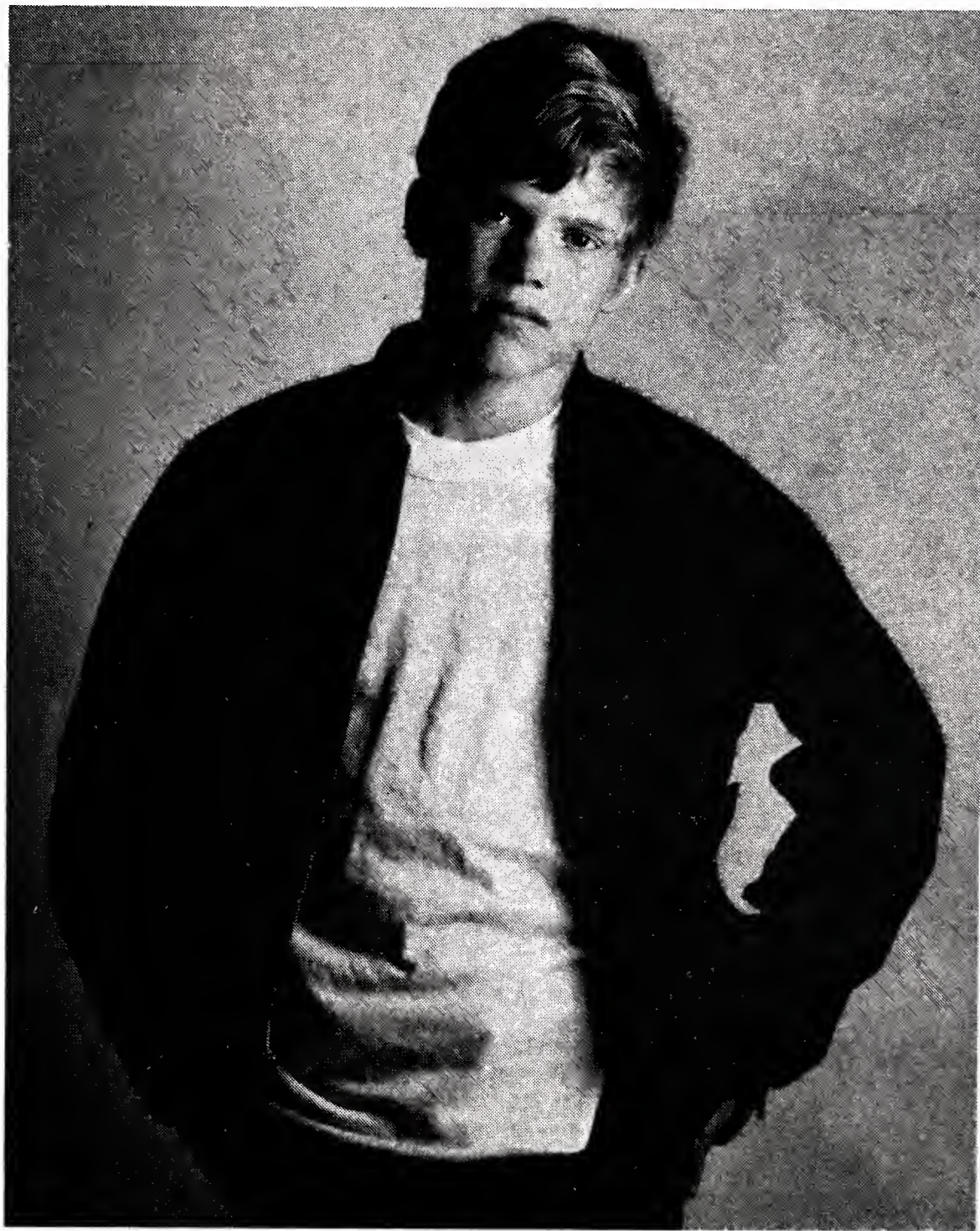
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SYSTEMS & PERIPHERALS

Continued from page 84

The board costs \$222.50.
Augat, Systems Division, P.O. Box 1037, 40 Perry Ave., Attleboro, Mass. 02703.

■ **Gould, Inc. has introduced the Gould 984 Programmable Controller, which includes a power supply, communications processor, central processing unit and I/O processor.**

The product works with systems supporting Gould's Modbus host software, which controls CRTs, a data access panel and an Ascii output device.

The Gould 984 Programmable Controller features a segment scheduler, an I/O service scheduler, 16K bytes Cmos random-access memory with battery backup and bipolar programmable read-only memory, the vendor said.

It includes three Modbus ports, a remote data access panel and a report generation port.

The product costs \$6,200.
Gould, Programmable Control Division, P.O. Box 3083, Andover, Mass. 01801.

■ **Data-Sud Systems U.S., Inc. has**

SORTER from page 83

brings the data back through the memory and in a sorted fashion, sends the data back to the place it originated, the vendor said. An additional five slots have been left on the chassis reportedly to allow tailoring of the device to the needs of particular vertical markets and applications.

DBA 1000 can sort files larger than 5M bytes by creating sorted strings of data and storing them on two closely coupled 5¼-in. Winchester disks. The disks — located within the accelerator's chassis — accept files up to 640M bytes.

Accel's DBA 1000 does not house the data base but receives a copy of the data file. The file itself remains stored in the host circuitry, so that in the event of failure the sort can be accomplished in the host software.

A spokesman said that any type of computer can use the accelerator, but the technology is particularly useful with relational data bases. The DBA 1000 will be available in quantity in June.

Accel is located at 7358 Trade St., San Diego, Calif. 92121.

CUTS from page 83

The catch is that users can only take advantage of the Model M4 as the last two members on a string made up of an Amdahl 6380 Model AA4 head-of-string unit and a Model B4.

Herein lies the problem for makers of IBM-compatible hardware. IBM is increasing the power and complexity of its new high-end systems and peripherals while at the same time significantly cutting the price of its current systems lineup. Consequently, companies like Amdahl and NAS — or more appropriately, Fujitsu Ltd. and Hitachi Ltd. — are being backed into a corner.

These companies have to spend more money on research and development to keep pace with new IBM products but are being forced into taking smaller profits per unit sold.

announced two models of its DSSEDPDX, a dual-ported random-access memory (RAM) expansion module that supports computers using the VME-bus or VMX-bus architectures.

The DSSEDPDX-1 features 512K bytes of RAM, and the DSSEDPDX-2 comes with 1M byte of RAM.

The products are said to allow jumper-selectable VME-bus memory access times to be set between 150 and 300 nsec and VMX-bus access times between 180 and 330 nsec.

The product's default base memory address is selectable by a jumper whenever the system is reset, the vendor said. Its base memory address reportedly can be modified to allow dynamic allocation of memory resources.

DSSEDPDX-1 sells for \$1,595; and DSSEDPDX-2 costs \$2,695.

Data-Sud Systems, Suite J, 2219 S. 48th St., Tempe, Ariz. 85282.

AUXILIARY EQUIPMENT

■ **RO Associates, Inc. has announced the Model 713 550W triple output switcher, which uses a magnetic reactor control in the primary and secondary circuits.**

The Model 713, packaged in a 360-cubic-in. box, delivers 5V at 50A and is adjustable $\pm 12V$ to $\pm 15V$ at 10A, the vendor said. The unit has 115 Vac or 220 Vac input selectable on the barrier strip.

Alternative secondaries providing 12V at 12A with a 14A surge; 24V at 4A with a 6A surge are available to power both 5¼-in. and 8-in. disk drives.

The Model 713 costs \$750.
RO Associates, 246 Caspian Drive, Sunnyvale, Calif. 94088.

■ **Leemah Datacom Security Corp. has introduced the Secure Access Multiport (SAM) System 351 — an updated version of its SAM 350 callback security equipment.**

The SAM System 351 is said to use programmable nonvolatile memory and callback to prevent dial-up access from unauthorized locations. It provides protection for up to 128 ports, the vendor said. The system features an audit trail and an expandable callback directory.

The price of the system is approximately \$500 per port.

Leemah Datacom Security Systems, 3948 Trust Way, Hayward, Calif. 94545.

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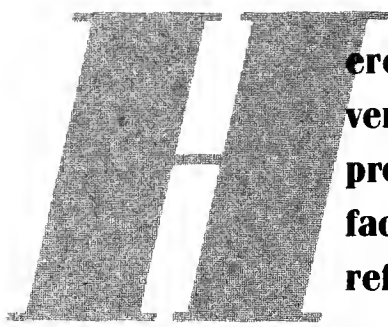
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MICROCOMPUTERS

Kaypro releases 512K-byte AT clone

SOLANA BEACH, Calif. — Kaypro Corp. has become the first U.S. manufacturer to introduce an IBM Personal Computer AT clone.

Priced at \$3,995 and scheduled for early March shipment, the Kaypro 286I costs the same as the base model Personal Computer AT. However, it comes with 512K bytes of random-access memory and two 1.2M-byte floppy disk drives, compared with the IBM system's 256K bytes and single 1.2M-byte disk drive.

The 286I will run Microsoft Corp.'s MS-DOS 3.0 and will take advantage of MS-DOS 3.1 when that software is available. The computer reportedly will be able to use the same PC-DOS software that runs

on the Personal Computer AT.

Like the Personal Computer AT, the 286I, or Kat as the company has dubbed it, uses a 6-MHz Intel Corp. 80286 chip and offers a socket for an 80287 math coprocessor for high-speed computations.

The Kaypro 286I comes with a color video card, two parallel ports and one serial port. It has eight internal bus slots — four occupied by the video and port cards and four available for other uses. The IBM system has a total of seven slots and does not come with video or port cards.

The Kaypro micro does not come with a monitor; the company will offer a color monitor separately that will cost \$595.

Kaypro does not now plan to offer a

20M-byte hard disk drive for its AT clone. Third-party vendors will meet that need, according to Marketing Vice-President David Kay. The Kaypro 286I comes with a series of applications from Micropro International Corp., including Wordstar.

Kaypro's AT look-alike is only the first of at least 10 such systems industry observers expect to roll out this year. Hewlett-Packard Co., Corona Data Systems, Inc. and Compaq Computer Corp. are expected to launch AT compatibles soon.

Kaypro is located at 533 Stevens Ave., Solana Beach, Calif. 92075.

This story first appeared in Infoworld, a Computerworld sister publication based in Menlo Park, Calif.

■ Control Data Corp. has introduced a 30M-byte internal hard disk drive for the IBM Personal Computer AT/95

■ Software Publishing Corp. has upgraded its PFS:Access communications software package for the IBM Personal Computer/95

INSIDE

Software/96

IBM offers graphics tool

RYE BROOK, N.Y. — IBM's Information Systems Group has introduced PC Storyboard, a graphics package designed to create screen-display presentations on the IBM Personal Computer line.

PC Storyboard reportedly allows users to create professional-looking presentations with special effects without requiring programming. The package consists of four modules: Picture Taker, Picture Maker, Story Editor and Story Teller, IBM said.

Picture Taker coresides in memory with other applications and captures screen images for inclusion in a presentation.

Picture Maker creates and modifies screens of text, figures and graphs in medium-resolution graphics mode. The module offers the ability to cut and paste from one picture to another. It also provides a library of symbols and four text-type styles in five sizes. In addition, Picture Maker uses halftones extensively to extend the number of colors and includes a composite mode to create pictures for composite or television monitors, IBM said.

See STORY page 98

MICRO BITS/THOMAS W. MADRON

Note statistical software limits

Once convinced that you need a statistical system, the next step is to obtain software that correctly provides the statistics you need, within the limits of your hardware.

For significant statistical analyses, you may wish to enhance your hard-

ware, although some, especially statistical software manufacturers, contend that bells and whistles are not necessary.

If you have a micro based on one of the processors in the Intel Corp. 8086 or 8088 families, you will be able to obtain a numeric coprocessor that extends the instruction set to provide hardware floating-point capabilities, which allow computational software to run faster. A minimum of 512K bytes of memory and a

See STATISTIC page 96

Madron is manager of computer services at North Texas State University, Denton, Texas.

Digital's GEM deliveries to begin

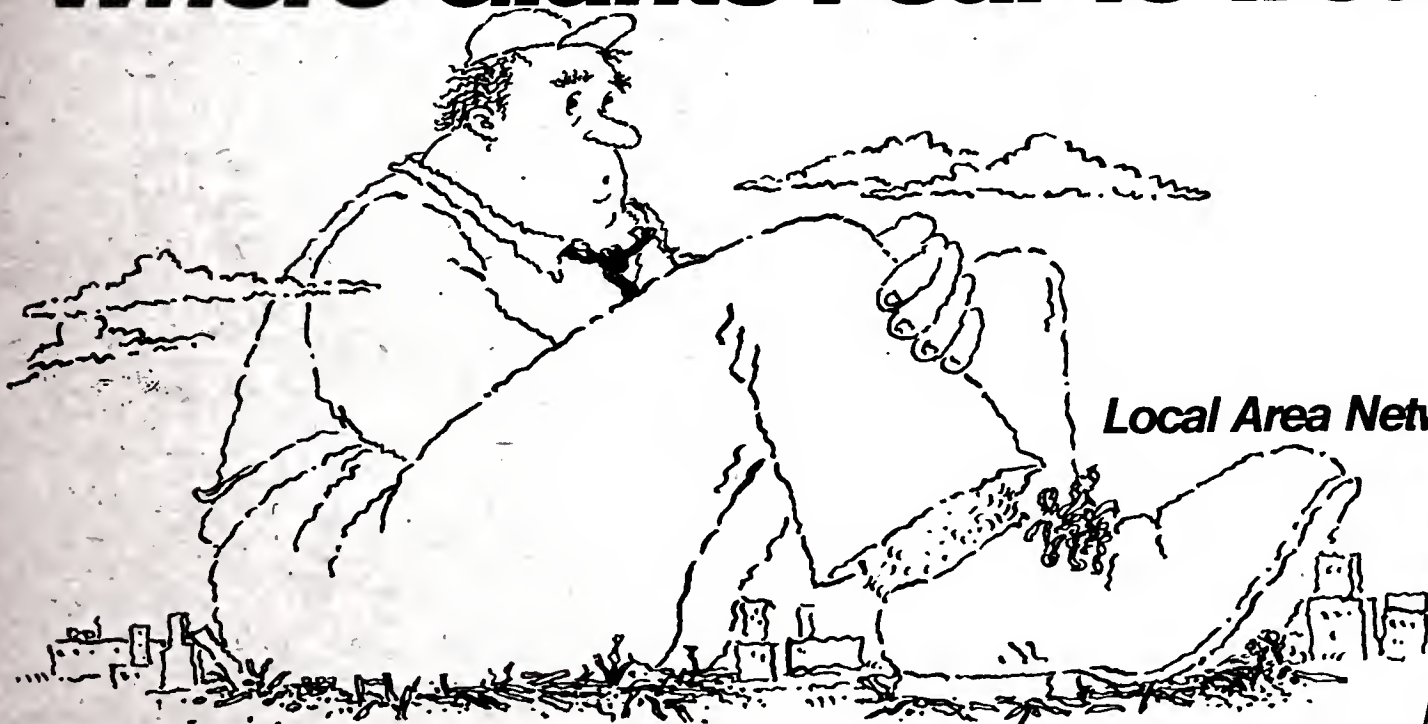
MONTEREY, Calif. — Digital Research, Inc. expected to meet its delivery schedule for its Graphics Environment Manager (GEM) by shipping the software to OEMs last week. A GEM tool kit for software developers will be available by April, the firm said.

GEM, an operating system extension,

initially will be offered for machines running under IBM PC-DOS, Microsoft Corp. MS-DOS and Digital Research Concurrent DOS operating systems. Announced last November, the software provides an "electronic desktop" interface much like that designed into the Apple Computer,

See GEM page 95

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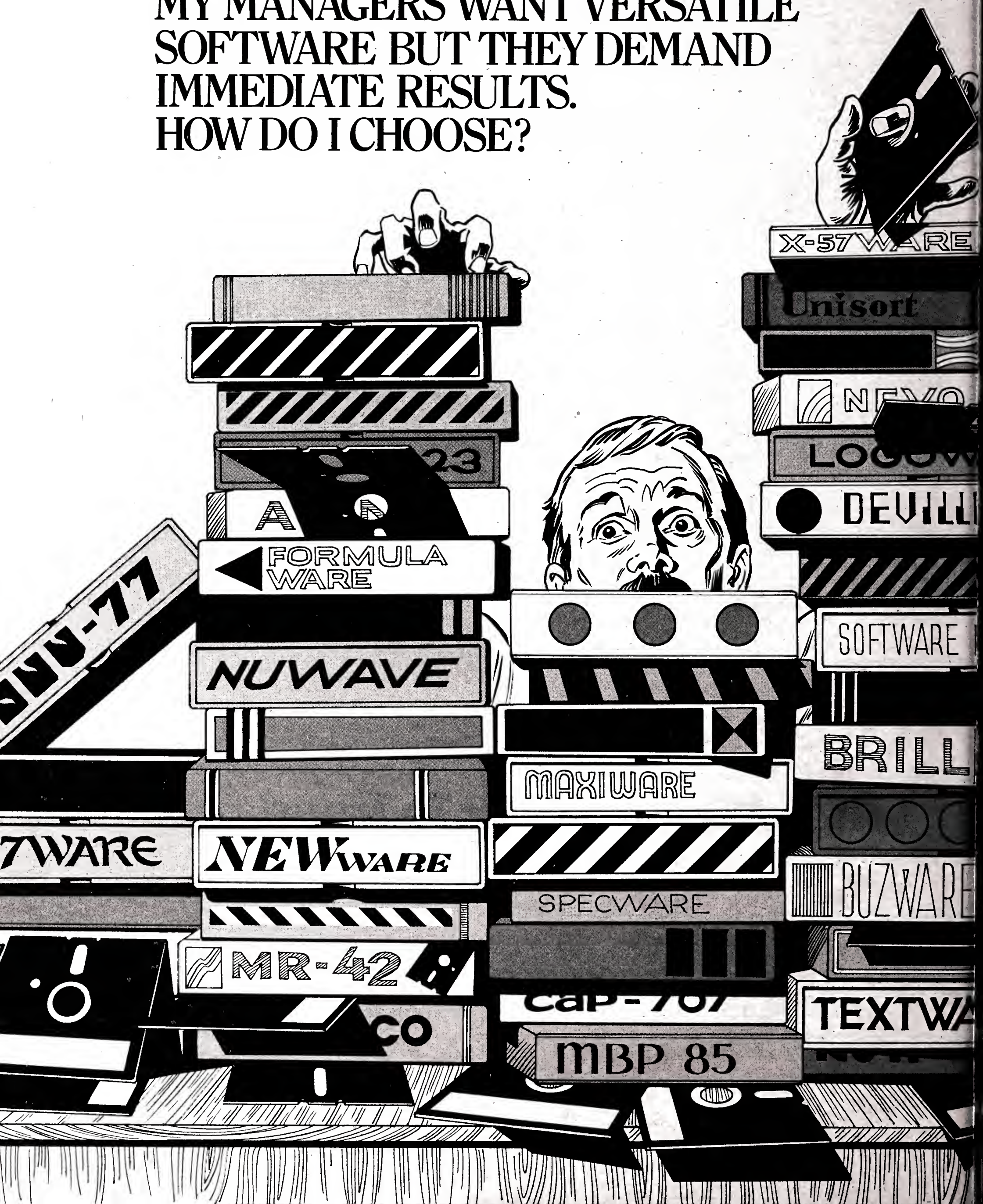
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organized on the desktop with the current open file on top. It's design like this which makes Framework intuitively easy, even for beginners.

Framework is versatile enough for serious spreadsheet or data management work, and its graphics capabilities can bring a little bit of "Star Trek" to even the most routine business report.

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MICROCOMPUTERS

Micros help filmmakers create images of outer space

MARINA DEL REY, Calif. — A microcomputer-based solid modeling system played a major supporting role in Metro-Goldwyn-Mayer/United Artist Entertainment Co.'s (MGM/UA) motion picture *2010*, which opened late last year in the U.S.

The Cubicomp Corp. Polycad/10 system, which generates three-dimensional shaded images, was used with an IBM Personal Computer and proprietary software, plus software designed by John Wash and Richard Hollander of Video Image, the production company responsible for the video display images. Wash said the system produced nearly all the video display images that filled the interior of the film's major set — the *Leonov* space ship on its voyage to a rendezvous near Jupiter.

Video Image used the system to develop an hour of computer animation at its shop near the MGM/UA soundstage where much of *2010*, the sequel

to *2001: A Space Odyssey*, according to Wash, is that the company can create data bases for the spacecraft, planets and other structures used in a movie and then use the data bases a number of times and from different angles to animate the objects. Wash said he is pleased with the ease of making changes.

Because Video Image bought one of the first systems delivered, it had to work around limitations in the available software, Wash said. The system's software does not allow for changing camera viewpoints, he said. It has a fixed viewpoint that Video Image has to work around, he added.

"If you want to fly around an object and see it from the viewer's point of view, you can't do it," he said.

Wash and Hollander, an engineer and programmer with Video Image, created sequences that were integral to the plot of *2010*, as well as generic material shown in the background, Wash said. Among the more spectacular footage was a sequence depicting a computer flyby of Europa, one of the moons of Jupiter, which duplicates film footage taken of a model of the moon's surface using single-frame animation, he said.

Background sequences ran the gamut of what might be expected on an interplanetary space flight: navigation readouts, status reports, radar sweeps, crew schedules and medical reports, Wash said. Video Image performed its own art direction for these

sequences, working directly with Peter Hyams, director and producer of the film.

Wash said that *2001: A Space Odyssey* used only a couple of computer-generated sequences, produced on a pen plotter and photographed on a display screen. The remainder were created using traditional animation techniques with no computer involvement, he said.

By comparison, Video Image produced virtually all its display sequences on its computer system, Wash said. Hence, the computerized images were generated by a computer and displayed on actual video monitors, rather than being projected from the rear of the set.



Computer-generated image of the *Leonov* spaceship in flight.

to the 1968 film *2001: A Space Odyssey*, was filmed, Wash said. The company later fed those images to CRT displays on the set of both the *Leonov* and its mission target, the *Discovery*.

Video Image chose the Polycad/10 system about 1½ years ago, Wash said. "We did not want to support a VAX or something that big," he said. The system's 512- by 512-pixel resolution was adequate for what the company wanted, and other systems the company looked at did not have as much software support, he said.

Images on the system can be rotated, rescaled and repositioned interactively using the keyboard and graphics tablet with no programming knowledge required, Wash said.

The system produces three-dimensional solid models on a microcomputer, creating a skeletal system that costs about \$20,000, but the skeletal system is not nearly adequate for movie-making, Wash said. "We developed our own package of software for purposes of color mapping automation and some facilities to help us animate the Cubicomp data bases," he said.

Video Image combined the Polycad/10 system with Cubicomp's two-dimensional computer paint program and its own animation master-control package, aptly named HAL after the HAL 9000 computer that "starred" in both films, Wash said.

The system's chief benefit to Vid-

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MICROCOMPUTERS

PFS:Access gets IBM additions

MOUNTAIN VIEW, Calif. — Software Publishing Corp. has enhanced its PFS:Access communications software for the IBM Personal Computer.

Enhancements include the ability to set up a Personal Computer's files so that they can be accessed by another Personal Computer.

PFS:Access now also offers support for the Xmodem protocol method of error checking and can store and automatically execute all dial-up and sign-on procedures.

PFS:Access is priced at \$140.

Software Publishing is located at 1901 Landings Drive, Mountain View, Calif. 94043.

Graphics program introduced for IBM micros lacking adapters

ARLINGTON, Mass. — Analytics International, Inc. has introduced Monografx, a graphics program designed for IBM Personal Computers lacking graphics adapters.

Monografx, which costs \$49.95, reportedly allows users to create free-form drawings such as organizational charts, calendars, bar charts, schedules and flow diagrams. The package can also generate common forms such as expense reports.

The package was designed for users who are unable or unwilling to spend more money and time on complex graphics offerings, said Ming Lee, the firm's product manager.

Monografx features pull-down menus, an on-line Help function, an Undo command and an on-disk tutorial. Nineteen fill patterns are provided for painting picture areas.

The program requires an IBM Personal Computer or compatible machine with 128K bytes of random-access memory and PC-DOS or MS-DOS 2.0 or higher. An 80-page user's guide is included. Monografx supports about 50 dot-matrix printers, the vendor said. It also supports most color/graphics display adapters.

Analytics International is located at 17 Oakland Ave., Arlington, Mass. 02174.

CDC cuts prices, announces drive

PLYMOUTH, Minn. — Control Data Corp. has released a 30M-byte hard disk drive that can be housed inside the IBM Personal Computer AT. The company also announced price cuts on its external Storgemaster 5¼-in. disk systems used with various IBM Personal Computers.

The CDC Storgemaster 630 disk drive's access time of 30 msec is reportedly 25% faster than the drive IBM supplies for the AT. The price of the drive is \$2,145, with volume discounts available.

The price of the 30M-byte Model 530 Storgemaster disk system was cut from \$3,390 to \$2,795; the 18M-byte Model 518 was decreased by \$300 to \$2,295; and the Model 301 Universal Single-Board Controller (which handles two drives) was decreased from \$599 to \$495.

More information can be obtained from CDC, 2200 Berkshire Lane N., Plymouth, Minn. 55441.

Hayden unwraps productivity tool for Macintosh

LOWELL, Mass. — Hayden Software Co. has introduced Ensemble, an integrated productivity package for the Apple Computer, Inc. Macintosh.

Ensemble supports word processing, information management, report generation, calculations, decision analysis, graphs and mail and list management, Hayden said.

The package, which costs \$299.95, runs on both the 128K-byte and 512K-byte models of the Macintosh. "Ensemble makes the 128K-byte version of the Macintosh a serious business computer for the first time," claimed Bruce Twickle, president of the Lowell, Mass.-based software firm.

Ensemble is the first integrated software developed specifically for the Macintosh and the only integrated program to run on the low-end Macintosh, the vendor said. Shipments are scheduled to begin March 11.

Hayden Software is located at 600 Suffolk St., Lowell, Mass. 01853.

GEM from page 91

Inc. Macintosh.

Nine OEMs have indicated some level of commitment to GEM, the most prominent of which are Applied Computer Techniques Ltd., Contel Cado, Epson America, Inc., Northern Telecom, Inc. and Texas Instruments, Inc. Twelve independent software vendors also have announced support for GEM, including Lifetree Software, Inc. and Thorn/EMI. Digital Research itself plans to offer GEM Draw, a retail graphics package bundled with GEM and a GEM desktop application, by April.

Digital Research can be reached through P.O. Box 579, Pacific Grove, Calif. 93950.

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MICROCOMPUTERS

SOFTWARE

■ Software Consulting Service, Inc. has introduced Series/1 data entry software for the IBM Personal Computer (S1DES/PC), a version of the vendor's IBM Series/1 S1DES data entry software.

S1DES/PC is written in assembler and allows the Personal Computer to act as a high-volume data entry station. Features are said to include a Help facility, menu operation, checkbox field edit options selection, operator statistics, integrated high-level language and functions for file handling, reporting and keyboard reassignment.

The software can create files on the Personal Computer that can be used for other Personal Computer applications or transmitted to a host for

processing, the vendor said.

S1DES/PC licenses for \$995.

Software Consulting Service, Suite 231, 8930 Fourwinds Drive, San Antonio, Texas 78239.

■ P-Stat has introduced a version of its P-Stat mainframe statistical analysis software for the IBM Personal Computer XT and Personal Computer AT.

The new P-Stat version reportedly is provided with the same functions as that of the P-Stat version for mainframe computers. It is said to offer interactive data management, data display, statistical analysis and report-writing capabilities.

Also included are an on-line Help facility, interactive data entry, relational data base capabilities, macros

Continued on page 98

STATISTIC from page 91

Winchester disk drive also may be in order.

Looking next at the software, one serious issue is the language chosen by the developer of the microcomputer statistical package.

For example, if the package is written in Microsoft Corp.'s GW-Basic, then the additional memory is worthless and the numeric coprocessor may be useless as well.

Interpreted Basic is too slow and even compiled Basic programs may be laggard on large-scale problems. Pascal, while used for some systems, is a poor choice for statistical software since it lacks some appropriate arithmetic operators.

The workhorse languages for statistical and mathematical systems are Fortran and micro-based subsets

of PL/I.

Fortran and PL/I have the requisite computational abilities and can often make use of expanded memory and numeric coprocessors.

Another potential problem is inconsistent quality control for the different packages: This can be particularly vexing in statistical analysis, where debate continues on what algorithms provide the most accurate results.

Another issue concerning potential users of the statistical software programs described below is that while they all offer some data management capabilities, they suffer from insufficient flexibility in importing and exporting data to and from other software.

If you use more than one package, which may be necessary since they do not all cover the same range of statistical functions, or move data from a spreadsheet like Lotus Development Corp.'s 1-2-3 or from a mainframe, it is likely that you will have to write one or more simple programs to reformat your data.

Some current offerings

Northwest Analytical, Inc.'s NWA Statpak, Jerry L. Hintze's Number Cruncher and DBI Software Products' Trajectories are examples of interpreted Basic systems. NWA Statpak appears to be the best and certainly has the most comprehensive documentation, but these programs all provide a wide variety of statistical procedures.

However, they suffer from the problems associated with interpreted Basic statistical packages: speed and memory limitations.

One distinct advantage of these packages is that they should run under most or all versions of MS-Basic running under MS-DOS (rather than requiring an IBM Personal Computer running under PC-DOS).

Microstat from Ecosoft, Inc., Abstat from Anderson-Bell, Human Systems Dynamics' PC Statistician and the Statistical Analysis System from Statistical Consultants, Inc. are all examples of modest but useful statistical systems. From the standpoint of ease of use and printed documentation, Microstat is the best of this group.

The version of PC Statistician that I reviewed ran only on an IBM Personal Computer or a compatible.

The third group of statistical packages, which includes the Statistical Package for the Social Sciences (SPSS) from SPSS, Inc.; ABC from the Inter-University Consortium for Political and Social Research at the University of Michigan at Ann Arbor; Systat, Inc.'s Systat; and Statpro from Wadsworth Professional Software, Inc. all attempt to be more expansive in conception and variety of procedures.

Most like mainframe systems

Of this third group, the SPSS and ABC packages are most like mainframe systems, although ABC has a restricted set of statistical procedures and was designed primarily for instruction.

SPSS is probably the best of the group, implementing most of the procedures found in the mainframe version. Systat is good with multivariate analysis.

SPSS, ABC and Systat will all run on most MS-DOS machines, while Statpro will run only on an IBM Personal Computer.



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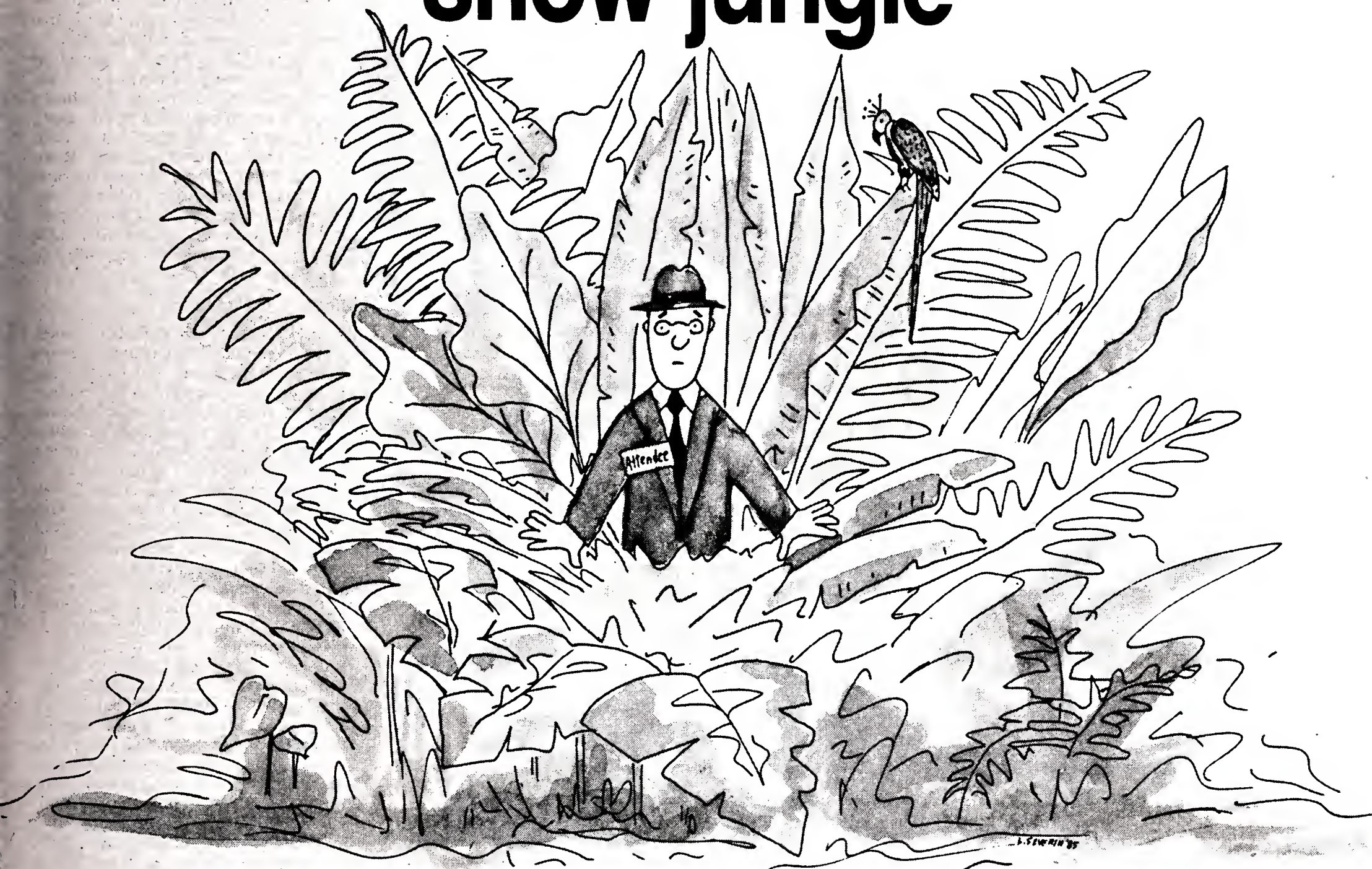
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MICROCOMPUTERS

Continued from page 96

and several statistical commands.

P-Stat requires a Personal Computer with 640K bytes of memory, Microsoft Corp. MS-DOS 2.1 or higher and the Intel Corp. 80287 or 8087 math coprocessor.

It is priced at \$695.

P-Stat, P.O. Box AH, Princeton, N.J. 08542.

■ Syscomp has announced a conversion utility program for the IBM Personal Computer XT and compatible microcomputers that is said to translate Ashton-Tate's Dbase III data base files to Lotus Development Corp.'s 1-2-3 or Symphony programs.

During a conversion to a Symphony worksheet file, the Dbase III Translate program will automatically

set up Symphony data base ranges and generate a form window, allowing the user immediate control over the Symphony data base, according to the vendor.

The program costs \$75.

Syscomp, Suite 210, 8825 Aero Drive, San Diego, Calif. 92123.

■ Software Research Technologies, Inc. has introduced Smartpath utility software, which reportedly permits Micropro International Corp.'s Wordstar to run from any directory or subdirectory, including the diskette drive.

Smartpath, which runs on the IBM Personal Computer, is said to permit Wordstar users to group letters, documents and programs in separate directories and subdirectories without having to keep copies of Wordstar on

each one.

Smartpath is priced at \$29.95.

Software Research Technologies, Suite 211, 3757 Wilshire Blvd., Los Angeles, Calif. 90010.

■ Software Building Blocks, Inc. has released the source code of Version 3.0 of its SBB Pascal compiler so that users may customize the compiler for their particular applications.

The compiler runs on micros under IBM's PC-DOS or Microsoft Corp.'s MS-DOS operating systems.

The \$2,500 license price for the source covers the complete commented source code of the compiler, the SBB Pascal editor and updates and support for one year.

Software Building Blocks, P.O. Box 119, Ithaca, N.Y. 14851.

STORY from page 91

Story Editor organizes images into presentations. Features include full and partial picture displays, zooming, shadowing, 10 picture-to-picture dissolve techniques, variable picture timing and other special effects.

Story Teller shows the presentation on a variety of output devices. The module gives runtime flexibility to start or stop at any point, along with branching ability. It also minimizes presentation program space with a stand-alone runtime program. Users may copy Story Teller to distribute their programs if each reproduced diskette is marked with IBM copyright information, according to the company.

Compatible packages

IBM cautioned that Picture Taker may be unable to capture screens from user programs that modify the interrupt table or bypass the Personal Computer's Binary Input/Output System to program the graphics adapter directly. While IBM has not tested third-party applications, a spokeswoman said that Lotus Development Corp.'s 1-2-3 does work with Picture Taker, and indicated that most other popular packages also are expected to be compatible.

PC Storyboard runs on the Personal Computer, Personal Computer XT, Personal Computer AT, Portable Personal Computer, PCjr, Personal Computer XT/370 and 3270. Personal Computer (with the model 5272 color display and graphics extension). All systems require a color monitor and 80-col. monitor — a red-green-blue (RGB) color monitor satisfies both requirements — and an IBM Color Graphics Adapter, Enhanced Graphics Adapter or equivalent.

Memory requirements are 256K bytes with PC-DOS 2.0 or 2.1 and 320K bytes with PC-DOS 3.0. The PCjr requires 384K bytes of memory.

Output devices supported

Supported output devices include an RGB monitor; a composite monitor; a standard TV; a large-screen projector; a videocassette recorder; an IBM Personal Computer Graphics Printer, which can produce seven shades of gray; and an IBM Personal Computer Color Printer, which can produce 16 of 91 different colors.

The PC Storyboard, available in March, is priced at \$250.

More information is available from IBM Information Systems Group, which is located at 900 King St., Rye Brook, N.Y. 10573.

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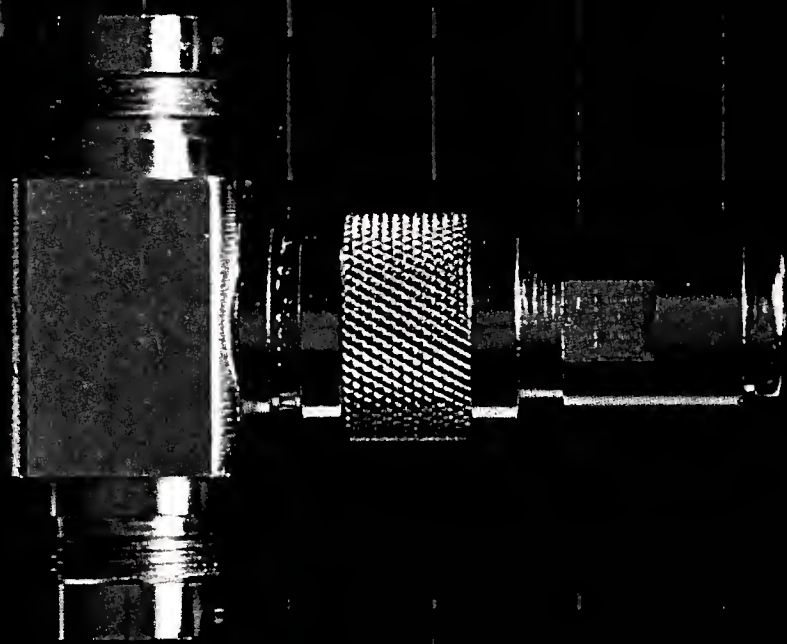
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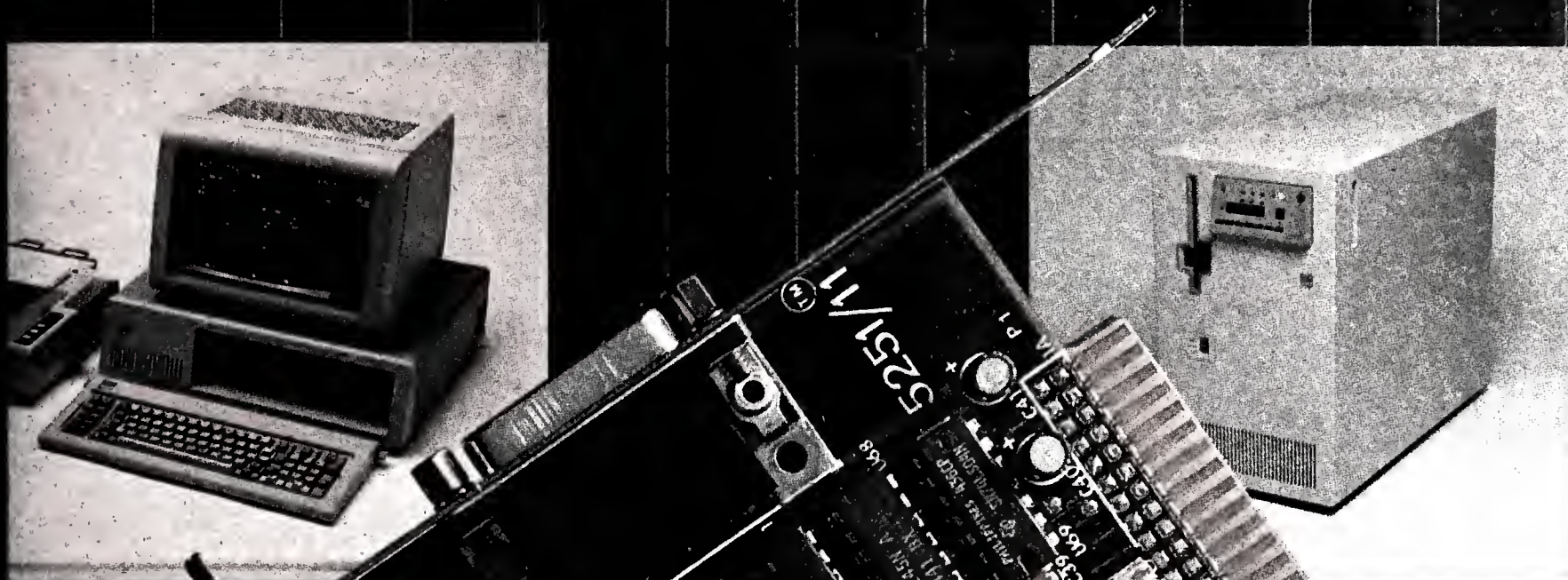
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The presentations will be held at the following locations:

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| ■ Chicago | April 9 |
| ■ Washington, D.C. | April 10 |
| ■ Toronto | April 12 |
| ■ Los Angeles | April 16 |
| ■ Dallas | April 17 |
| ■ New York City | April 18 |
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COMPUTER INDUSTRY

Intel to sell micro add-ons to end users

By Peter Bartolik
CW Staff

HILLSBORO, Ore. — Intel Corp. recently announced a program to develop and sell microcomputer add-on products to business end users, signaling a new direction for a company whose revenue has soared to \$1.6 billion through sales of components and systems to OEMs.

Intel's Personal Computer Enhancement Operation is part of the Intel Development Operation, an "incubator" of new business ventures, according to the managers of the division.

The new organization began shipping Intel's 8087 and 80287 math coprocessors to computer retail outlets in December, according to Richard Bader and James B. Johnson, operation managers for the venture.

Additionally, the organization plans to announce in May several products it jointly developed with other companies.

Intel's push to capture end-user sales will be directed through retail chains, accompanied by national advertising aimed at "power users and decision makers," according to Bader, who handles marketing and strategic planning.

Johnson, who concentrates on engineering, said the operation was formed one year ago with a charter from Intel to investigate the market for add-ons to IBM's Personal Computer line and compatibles. He said \$1 billion in sales of add-on products for IBM and compatible machines and a 30% to 50% growth rate are projected this year in offices industrywide.

During development of a business strategy, Intel realized that its name had become an asset in the end-user market in addition to the OEM market where it had previously concentrated. "People associate Intel with innovation and technology," Johnson said.

See **INTEL** page 109

Exxon quits office mart

Harris division acquires Exxon technology rights, intends to continue service and support

By Peter Bartolik
CW Staff

MELBOURNE, Fla. — Harris Corp. announced recently that its Lanier Business Products, Inc. division has agreed to acquire the customer base and product technology rights of Exxon Corp.'s Exxon Office Systems Co. Terms of the cash transaction were not revealed.

The announcement marked Exxon's retirement from a decade-long battle to carve out a share of the office systems market. A number of ventures were formed by the oil company in the early 1970s to develop and market products aimed at the office market. Those ventures were combined in 1981 and the company continued to market the Qyx electronic typewriter, the Qwip facsimile machine and word processing equipment.

Peter Carney, a Harris spokesman, said

Lanier will extend employment offers to Exxon Office Systems' domestic field service and sales force. A spokeswoman for Exxon, Ann Frechette, said about 1,000 people are employed in the field group.

Carney said Lanier will assume all service and support activities for existing Exxon customers and will acquire existing inventory to service the installed base of Exxon equipment, which is estimated at about 60,000 customers. The company intends to provide full service, spare parts and support to users of Exxon equipment.

Lanier also will acquire the technology rights to Exxon products. Carney would not reveal specific plans for use of that technology. "We have a lot of options and right now we want to keep those options open," he said.

Frechette said Exxon currently plans to
See **HARRIS** page 109

■ Convergent Technologies, Inc. recently reported an \$18.9 million pretax loss for the fourth quarter and a \$14 million loss for the year/**104**

■ Hewlett-Packard Co. experienced stronger growth in orders in January than the 7% pace previously reported for November and December; but the 15% increase for the quarter still lagged the pace of a year ago/**104**

Lotus takes aim at gray market

By Edward Warner
CW Staff

CAMBRIDGE, Mass. — Lotus Development Corp. struck a blow against the gray market for its software last week, unveiling a system that would let it determine which of its authorized dealers were selling Lotus products to gray-market price-cutters.

The system will place a bar code on the package of each Lotus software product. Lotus will record the bar code when the software is shipped to its distributor, and the distributor will record the bar code when each product is shipped to an authorized Lotus dealer. The distributor will upload its bar code records to Lotus daily.

When an advertisement appears from a gray marketer offering a Lotus product, Lotus will buy a sample and use the bar

code to determine its source. "We are fully prepared to terminate anyone within our distribution network [who] we find supplying our products to unauthorized sources," warned John Shagoury, Lotus sales operations manager.

The unauthorized dealers, many of which are mail-order firms, sell far below list price and have become a burden to authorized Lotus dealers, asserted Steve Crummy, Lotus' director of sales. The authorized dealers lose customers to those dealers and still end up providing after-sale service to gray-market shoppers.

"To a large extent, the success of our products depends on trained, dedicated dealers," he said. "We can't stand by and let the gray market erode their share of the business."

See **LOTUS** page 106

R&D tax credit extension backed by government, industry reports

By Mitch Betts
CW Washington Bureau

WASHINGTON, D.C. — In the continuing scramble to obtain tax breaks from the U.S. Congress, the computer industry's effort to keep the 25% research and development tax credit was bolstered recently by three separate reports supporting permanent extension of the credit, which otherwise will expire at the end of 1985.

The R&D credit received support from the Congressional Research Service, the analytical arm of the U.S. Library of Congress; the President's Commission on Industrial Competitiveness, chaired by Hewlett-Packard Co. President John A. Young; and the industry-backed Coalition for the Advancement of Industrial Technology (Cait). Cait, based here, is a single-interest lobbying group consisting of 52 corporations, 15 universities and nine trade associa-

tions, including many representatives from the computer, electronics and semiconductor industries.

All three studies, released during the last few weeks, said the credit has boosted R&D expenditures since enacted in 1981 and that extension is needed to help U.S. high-technology companies stay competitive with foreign rivals, particularly government-subsidized Japanese firms.

Politically, the studies may enhance the chances of extension bills (S. 58 and H.R. 1188) recently introduced in Congress at a time when many industry tax breaks are targeted for elimination. A three-year extension of the R&D credit was included in the U.S. Department of the Treasury's controversial tax reform proposal, which calls for termination of most other tax credits.

Referring to the studies by the
See **BREAKS** page 106

Industry downturn looms



INDUSTRY INSIGHT

Peter Bartolik
CW Senior Editor

After leading the U.S. economy for more than a year, the computer industry is faced with an unexpected downturn that will bear close scrutiny during the next six months.

Exclusive of the many one-product microcomputer vendors that had already fallen on hard times and ebbing semiconductor industry fortunes, the mainstream participants in the computer equipment and software industry had been riding a heady wave of increasing orders and booming profits.

That wave abruptly crested recently when IBM announced it expected great difficulties in showing

any profit increase for the current quarter, compared with the profit it posted one year ago. Data General Corp. also weighed in with an announcement of expected flat profits; Hewlett-Packard Co. said the last two months of 1984 were off, although January was somewhat better, according to the company's latest quarterly report; and Digital Equipment Corp. apparently told Wall Street analysts not to expect too much this quarter.

Much of the problem stems from the tremendous value of the U.S. dollar in the international currency market. The low valuations of foreign currencies has cut much of the profits out of overseas sales by U.S. vendors. This problem has been going on for some time.

However, the indications are that domestic orders have also trailed off
See **INDUSTRY** page 109

COMPUTER INDUSTRY

HP reports 20% revenue increase, 15% order growth for quarter

PALO ALTO, Calif. — Hewlett-Packard Co. recently reported a 20% increase in revenue for the first quarter ended Jan. 31 and said orders picked up in the final month of the quarter.

A month earlier, HP executives said the company experienced only a 7% increase in orders for November and December. In the report for the quarter, however, HP said orders for the quarter overall were up 15%.

The company reported revenue of \$1.53 billion, up from \$1.27 billion a year earlier. Profits for the quarter were up 17% to \$116 million, or 45 cents per share, compared with \$99 million, or 39 cents per share, in the

first quarter of 1983. The 1983 figures do not include an extraordinary gain of \$118 million, or 46 cents per share, because of elimination of taxes owed by domestic international sales corporations.

The 15% gain in orders for the quarter reflected a 10% rise in domestic orders and a 21% rise in international orders.

HP President John A. Young said he was pleased with the pickup in orders for January but remains cautious. "For the near term, we expect to see only a moderate growth in our domestic business, largely because of a slowing in the U.S. economy," he said.

Convergent posts 1984 loss

SANTA CLARA, Calif. — Convergent Technologies, Inc. recently reported a loss of \$13.8 million, or 38 cents per share, for 1984, including a loss of \$14.5 million because of discontinuance of its Workslate laptop computer operations. The company also posted a fourth-quarter pretax loss of \$18.9 million.

Excluding discontinued operations, the company posted a profit of \$687,000 or 2 cents per share. That figure reflects a pretax operating loss of \$2.7 million that was offset by tax benefits of \$3.3 million.

In 1983, the company posted profits of \$14.9 million, or 40 cents per share, which included an after-tax loss of \$2.4 million for the Workslate operations.

In the fourth quarter ended Dec. 31, the firm posted a loss from continuing operations of \$9.3 million — reflecting an operating loss of \$18.9 million offset by tax benefits of \$9.5 million.

Including a \$2.6 million loss for the Workslate operations, the total fourth-quarter loss was \$11.8 million, or 33 cents per share. In the year-earlier fourth quarter, the company had posted profits of \$3.9 million, or 10 cents per share, which included a Workslate-related loss of \$2.1 million.

Revenue for the quarter just ended was \$115.4 million, compared with \$45 million a year earlier. Revenue for 1984 was \$361.7 million, compared with \$163.2 million in 1983.

Cullinet Software continues 50% growth rate for 1985

WESTWOOD, Mass. — Cullinet Software, Inc. continued its 50% growth rate for 1985 with a recent third-quarter report showing both revenue and profits increasing in line with the previous two quarters.

The company reported revenue of \$47.4 million for the quarter ended Jan. 31, up 51% from \$31.3 million in the third quarter of 1984. Profits

rose 50% to \$6.3 million, or 21 cents per share, compared with year-earlier profits of \$4.23 million, or 14 cents per share.

For the nine months ended Jan. 31, Cullinet posted revenue of \$131.3 million, up 55% over the year-earlier period, and profits of \$17.8 million, or 59 cents per share, up 53% over the year-earlier period.

MSA announces sale of divisions

ATLANTA — Management Science America, Inc. (MSA) recently announced that it had reached an agreement to sell two of its retail microcomputer software subsidiaries to Encyclopaedia Britannica, Inc.

MSA, which announced last October its intention to sell its retail software divisions, said it had agreed to sell its Designware and Eduware subsidiaries.

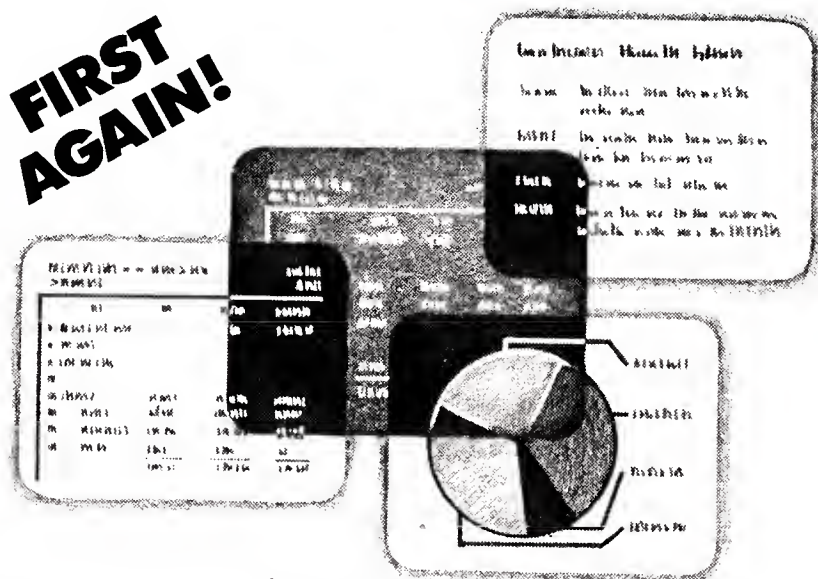
Still up for sale is the company's

Peachtree Software, Inc. subsidiary.

An MSA spokesman confirmed published reports that the company had conducted negotiations to sell Peachtree to Microcomputer Corp., a Florida-based chain of retail computer stores.

The spokesman said those negotiations had not been successful but added that MSA is continuing to negotiate to sell the Peachtree subsidiary.

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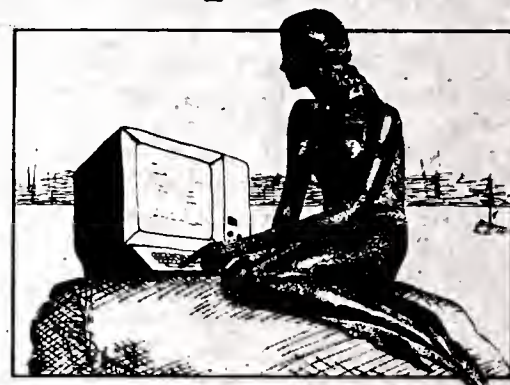
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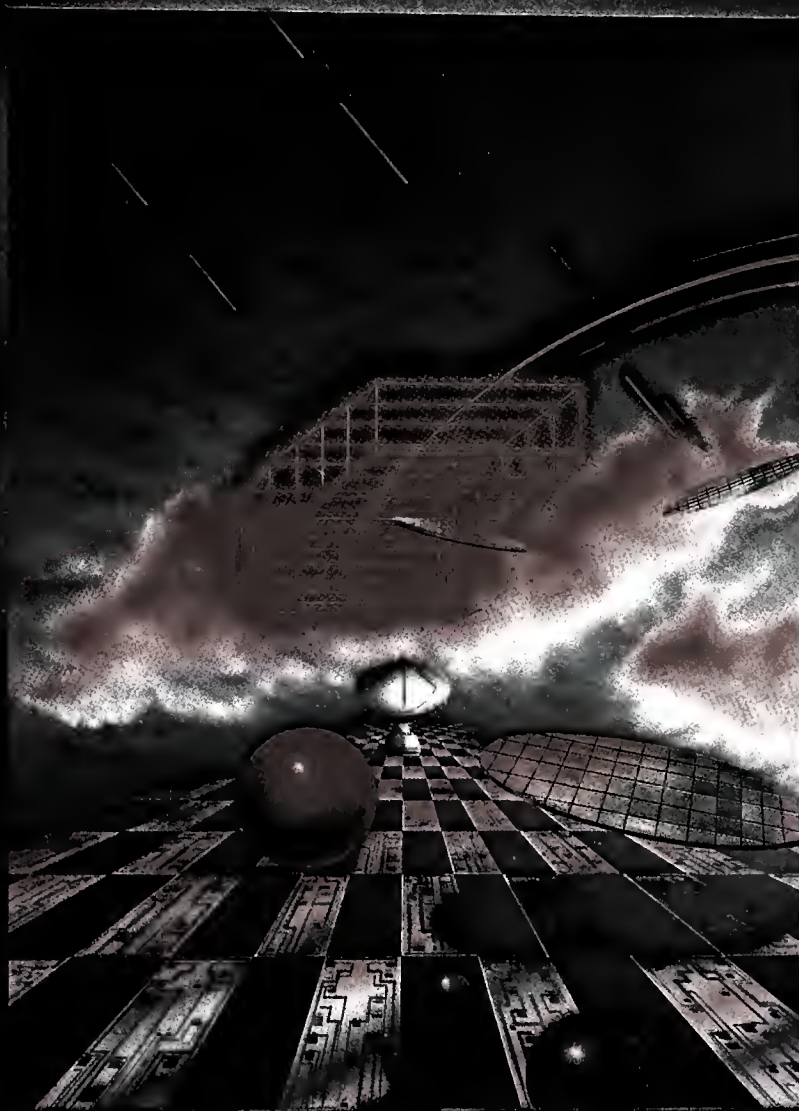
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Computer Science and Engineering									PERSONAL COMPUTERS									
INTRODUCTION TO COMPUTERS									18813	EE 5144-80	Inside the IBM PC	Wed.	4/3	5:30-7:30	Lexington	2.5	\$395	
18124	COM 5123-80	Introduction to Computers	Wed.	4/3	7:30-9:30	Lexington	2.5	\$395	18130	COM 5127-50	Personal Computer Software	Thu.	4/4	8:00-10:00	Burl. Campus	2.0	\$495	
18130	COM 5127-50	Personal Computer Software	Thu.	4/4	8:00-10:00	Burl. Campus	2.0	\$495	★ 18145	COM 5203-40	Lotus 1-2-3 for Business	Tue.	4/2	5:30-7:30	Dedham	3.0	\$525	
18145	COM 5203-40	Lotus 1-2-3 for Business	Tue.	4/2	5:30-7:30	Dedham	3.0	\$525	Semiconductor Science and Microelectronics									
MICROCOMPUTER SYSTEMS									SEMICONDUCTOR SCIENCE									
18151	EE 5111-25	Introduction to Microcomputer Systems	Mon	4/1	6:00-8:00	Marlborough	2.5	\$395	★ 18829	EE 5329-80	Microwave Measurement Techniques	Tue.	4/2	5:30-7:30	Lexington	2.5	\$395	
18166	EE 5111-60	Introduction to Microcomputer Systems	Tue	4/2	8:00-10:00	Chelmsford	2.5	\$395	18834	EE 5145-50	Microwave Semiconductor Engineering	Tue.	4/2	8:00-10:00	Burl. Campus	2.5	\$395	
18171	EE 5111-80	Introduction to Microcomputer Systems	Wed	4/3	5:30-7:30	Lexington	2.5	\$395	18840	EE 5116-80	Introduction to Solid State Principles	Wed.	4/3	5:30-7:30	Lexington	2.5	\$395	
18187	EE 5114-80	Microcomputer Operating Systems	Wed	4/3	7:30-9:30	Lexington	2.5	\$395	18855	EE 5116-60	Introduction to Solid State Principles	Tue.	4/2	6:00-8:00	Chelmsford	2.5	\$395	
18192	EE 5114-60	Microcomputer Operating Systems	Tue.	4/2	6:00-8:00	Chelmsford	2.5	\$395	18861	EE 5117-80	Principles of Semiconductor Devices	Mon.	4/1	7:30-9:30	Lexington	2.5	\$395	
18200	EE 5305-60	8088/8086 Microprocessor Systems Design	Thu.	4/4	8:00-10:00	Chelmsford	2.0	\$395	TV18876	EE 5117-15	Principles of Semiconductor Devices	Wed.	4/3	5:30-7:30	Boston	2.5	\$395	
18215	EE 5305-40	8088/8086 Microprocessor Systems Design	Wed.	4/3	5:30-7:30	Dedham	2.0	\$395	18881	EE 5117-60	Principles of Semiconductor Devices	Tue.	4/2	8:00-10:00	Chelmsford	2.5	\$395	
18221	EE 5305-50	8088/8086 Microprocessor Systems Design	Mon.	4/1	8:00-10:00	Burl. Campus	2.0	\$395	18897	EE 5117-50	Principles of Semiconductor Devices	Thu.	4/4	8:00-10:00	Burl. Campus	2.5	\$395	
★ 18236	EE 5338-50	MC68020 Architecture & Programming	Mon.	4/1	6:00-8:00	Burl. Campus	2.5	\$395	18904	EE 5313-50	Semiconductor Optoelectronics II: Lasers and Emitters	Thu.	4/4	6:00-8:00	Burl. Campus	2.5	\$395	
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18278	EE 5132-60	Microcomputer Interfacing and Bus Structures	Tue.	4/2	6:00-8:00	Chelmsford	2.5	\$395	TV18931	EE 5310-15	VLSI Gate Array Design	Tue.	4/2	5:30-7:30	Boston	2.5	\$395	
18283	EE 5321-25	Microprogrammed Computer Design	Mon.	4/1	8:00-10:00	Marlborough	2.5	\$395	★ 18946	EE 5331-80	VLSI Design for Testability	Mon.	4/1	7:30-9:30	Lexington	2.5	\$395	
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COMPUTER AUTOMATION									18967	EE 5307-50	Integrated Circuit Fabrication	Wed.	4/3	6:00-8:00	Burl. Campus	2.5	\$395	
18306	EE 5101-80	Data Acquisition Systems	Wed.	4/3	5:30-7:30	Lexington	2.5	\$395	18972	EE 5320-80	Photolithographic Processing for IC Fabrication	Mon.	4/1	7:30-9:30	Lexington	2.5	\$395	
V18311	EGG 5102-15	Introduction to CAD/CAM Technology	Thu.	4/4	5:30-7:30	Boston	2.5	\$395	18988	EE 5328-80	Integrated Circuit Manufacturing Techniques and Trends	Thu.	4/4	5:30-7:30	Lexington	2.5	\$395	
18327	EGG 5102-20	Introduction to CAD/CAM Technology	Tue.	4/2	8:00-10:00	Framingham	2.5	\$395	18993	EE 5325-40	Microelectronic Interconnections and Packaging	Mon.	4/1	7:30-9:30	Dedham	2.5	\$395	
18332	EGG 5102-55	Introduction to CAD/CAM Technology	Wed.	4/3	6:00-8:00	Burl. H.S.	2.5	\$395	Communications and Systems Engineering									
18348	EGG 5104-01	Introduction to CAD/CAM Operations	Mon./Wed.	4/1	6:00-9:00	Boston	3.0	\$495	COMMUNICATIONS THEORY									
18353	EGG 5301-01	Intermediate CAD/CAM Operations	Wed./Fri.	4/3	6:00-9:00	Boston	3.0	\$495	19004	EE 5151-55	Principles of Communications Theory	Wed.	4/3	8:00-10:00	Burl. H.S.	2.5	\$395	
18369	IND 5105-50	Computerized Process Control	Wed.	4/3	6:00-8:00	Burl. Campus	3.0	\$395	19010	EE 5301-55	Digital Modulation Techniques	Wed.	4/3	6:00-10:00	Burl. H.S.	2.5	\$395	
ARTIFICIAL INTELLIGENCE AND ROBOTICS									★ 18299	EE 5342-40	Signal Processing Microprocessors	Tue.	4/2	7:30-9:30	Dedham	2.5	\$395	
18374	EE 5121-50	Introduction to Artificial Intelligence	Tue.	4/2	6:00-8:00	Burl. Campus	2.5	\$395	TELECOMMUNICATIONS SYSTEMS TECHNOLOGY									
18380	EE 5121-40	Introduction to Artificial Intelligence	Thu.	4/4	7:30-9:30	Dedham	2.5	\$395	19025	EE 5107-80	Principles of Telecommunications: Part II	Tue.	4/2	7:30-9:30	Lexington	2.5	\$395	
18395	EE 5121-20	Introduction to Artificial Intelligence	Wed.	4/3	8:00-10:00	Framingham	2.5	\$395	19031	EE 5107-50	Principles of Telecommunications: Part II	Mon.	4/1	6:00-8:00	Burl. Campus	2.5	\$395	
V18402	EE 5121-15	Introduction to Artificial Intelligence	Mon.	4/1	5:30-7:30	Boston	2.5	\$395	19046	EE 5322-20	Telecommunications Switching Systems	Tue.	4/2	6:00-8:00	Framingham	2.5	\$395	
18418	COM 5113-80	LISP Programming	Wed.	4/3	5:30-7:30	Lexington	2.5	\$395	19051	EE 5322-80	Telecommunications Switching Systems	Thu.	4/4	5:30-7:30	Lexington	2.5	\$395	
18423	COM 5113-50	LISP Programming	Tue.	4/2	8:00-10:00	Burl. Campus	2.5	\$395	19067	EE 5308-55	Local Area Networks	Thu.	4/4	6:00-8:00	Burl. H.S.	2.5	\$395	
18439	EE 5314-80	Expert Systems Design	Thu.	4/4	5:30-7:30	Lexington	2.5	\$395	19072	EE 5155-25	Telecommunications Transmission Techniques	Mon.	4/1	8:00-10:00	Marlborough	2.5	\$395	
18444	EE 5157-60	Machine Vision and Pattern Recognition	Tue.	4/2	8:00-10:00	Chelmsford	2.5	\$395	19088	EE 5323-25	Radio Systems for Telecommunications	Mon.	4/1	6:00-8:00	Marlborough	2.5	\$395	
18450	EE 5327-60	Fifth Generation Plus	Tue.	4/2	6:00-8:00	Chelmsford	2.5	\$395	19093	EE 5102-80	Optical Fiber Communications Systems	Mon.	4/1	5:30-7:30	Lexington	2.5	\$395	
18465	IND 5100-80	Industrial Robotics Technology	Thu.	4/4	5:30-7:30	Lexington	2.5	\$395	19101	EE 5104-40	Satellite Communications	Mon.	4/1	5:30-7:30	Dedham	2.0	\$395	
18471	EE 5135-80	Digital Signal Processing	Wed.	4/3	5:30-7:30	Lexington	2.5	\$395	19116	EE 5330-80	Systems Network Architecture	Tue.	4/2	7:30-9:30	Lexington	2.5	\$395	
18486	COM 5112-80	Knowledge Engineering	Wed.	4/3	5:30-7:30	Lexington	2.5	\$395	19436	EE 5139-80	Data Communications Network Components	Tue.	4/2	5:30-7:30	Lexington	2.5	\$395	
18491	EE 5124-80	Speech Synthesis & Recognition	Thu.	4/4	7:30-9:30	Lexington	2.5	\$395	19121	EE 5153-40	Automated Office Systems	Mon.	4/1	7:30-9:30	Dedham	2.0	\$395	
19415	IND 5200-80	Automatic Test Equipment	Thu.	4/4	5:30-7:30	Lexington	2.5	\$395	19137	EE 5137-60	Introduction to Data Communication Systems	Tue.	4/2	6:00-8:00	Chelmsford	2.5	\$395	
DIGITAL COMPUTER TECHNOLOGY									19142	EE 5137-75	Introduction to Data Communication Systems	Wed.	4/3	6:00-8:00	Westwood	2.5	\$395	
18509	EE 5113-80	Interactive Computer Graphics	Mon.	4/1	5:30-7:30	Lexington	2.0	\$395	19158	EE 5137-80	Introduction to Data Communication Systems	Thu.	4/4	5:30-7:30	Lexington	2.5	\$395	
18514	EE 5134-80	Principles of Digital Logic Design	Tue.	4/2	5:30-7:30	Lexington	2.5	\$395	19163	EE 5315-80	Teletraffic Engineering	Tue.	4/2	5:30-7:30	Lexington	2.5	\$395	
18520	EE 5333-80	Advanced Digital Logic Design	Wed.	4/3	7:30-9:30	Lexington	2.5	\$395	19179	EE 5324-80	Integrated Services Digital Networks	Tue.	4/2	7:30-9:30	Lexington	2.0	\$395	
SOFTWARE ENGINEERING									TELECOMMUNICATIONS ADMINISTRATION									
18611	COM 5110-80	Data Base Systems Concepts	Tue.	4/2	5:30-7:30	Lexington	2.5	\$395	19184	EE 5160-40	Telecommunications Network Operations	Mon.	4/1	5:30-7:30	Dedham	2.0	\$395	
18535	COM 5116-80	Logical Data Base Design	Wed.	4/3	5:30-7:30	Lexington	2.5	\$395	19190	EE 5201-80	Telecommunications Network Administration	Thu.	4/4	5:30-7:30	Lexington	2.0	\$395	
18541	TMG 5112-55	Software Project Management	Mon.	4/1	6:00-8:00	Burl. H.S.	2.5	\$395	19207	EE 5204-80	Telecommunications Regulations	Thu.	4/4	7:30-9:30	Lexington	2.0	\$395	
18556	EE 5136-80	Design of Computer Operating Systems	Tue.	4/2	8:00-10:00	Lexington	2.5	\$395	19212	EE 5204-60	Telecommunications Regulations	Tue.	4/2	6:00-8:00	Chelmsford	2.0	\$395	
18561	EE 5138-80	Software Engineering for Hardware Designers	Tue.	4/2	6:00-8:00	Lexington	2.5	\$395	19228	EE 5203-80	System Procurement	Thu.	4/4	7:30-9:30	Lexington	2.0	\$395	
18577	EE 5213-50	MS-DOS/PC-DOS Operating Systems for Programmers	Thu.	4/4	6:00-8:00	Burl. Campus	2.5	\$395	Technical Management									
18582	COM 5103-80	UNIX Operating System	Tue.	4/2	5:30-7:30	Lexington	2.0	\$395	TECHNICAL MANAGEMENT									
18598	COM 5103-40	UNIX Operating System	Thu.	4/4	5:30-7:30	Dedham	2.0	\$395	19254	TMG 5100-80	Finance for Technical Professionals	Mon.	4/1	5:30-7:30	Lexington	2.0	\$395	
18605	COM 5200-20	UNIX for Systems Programmers	Wed.	4/3	6:00-8:00	Framingham	2.0	\$395	19233	TMG 5102-80	Technical Project Administration	Mon.	4/1	7:30-9:30	Lexington	2.0	\$395	
18738	COM 5106-80	Software Verification and Validation	Thu.	4/4	7:30-9:30	Lexington	2.5	\$395	19249	TMG 5107-50	Modern Technical Management: Functional Aspects	Mon.	4/1	8:00-10:00	Burl. Campus	2.0	\$395	
18626	COM 5101-80	Software Engineering Economics	Thu	4/4	7:30-9:30	Lexington	2.5	\$395	19260	TM								

COMPUTER INDUSTRY

Bell South subsidiary to begin marketing DEC office systems

BIRMINGHAM, Ala. — Bell South Advanced Systems, Inc., a subsidiary of Bell South Corp., a regional telephone operating company, announced last week it will market a complete line of Digital Equipment Corp. office systems products beginning this spring.

The company said it had reached agreement with DEC to market DEC's All-In-One Office and Information System to large users and DEC's A-To-Z Integrated System for small users.

Mike Harrell, president of Bell South Advanced Systems, said, "[DEC's] systems will complement

our existing line of voice and data communications equipment.

"We are adding an extensive line of office systems products to enable us to become a leading source of integrated office systems," Harrell continued.

According to Harvey Weiss, DEC vice-president and area manager for the Mid-Atlantic and Southern states, the agreement will benefit Southeastern businesses seeking to automate operations.

The companies together "can offer one source for a total solutions package of office systems equipment," Weiss said.

Honeywell reshuffles execs

MINNEAPOLIS — Honeywell, Inc. recently announced an executive reorganization with Vice-Chairman and former Honeywell Information Systems President James J. Renier joining with Edson W. Spencer, Honeywell's chairman and chief executive officer, to comprise the company's executive office.

Spencer said the reorganization will enable Renier to manage both the computer and controls divisions of Honeywell.

Named to the new position of executive vice-president for information systems was William N. Wray, formerly group vice-president of the commercial buildings group and communications divisions.

The executive vice-presidents of the company's five major divisions and all of the firm's corporate executives will report to the new executive office.

Commenting on the realignment, Spencer said, "In addition to meeting the future needs of our long-standing computer customers, information systems will be a central part of the company's plans to provide integrated systems using computer, communications and controls for key industrial, commercial building and government markets."

Wray will continue as chairman of the Honeywell Ericsson Development Co., a joint venture with L.M. Ericsson Co. of Sweden.

Intecom posts 1984 revenue growth of 65%

ALLEN, Texas — Intecom, Inc. recently announced 1984 revenue of \$131.6 million, up more than 65% from \$79.3 million in 1983.

The communications products vendor posted profits of \$11.7 million, or 37 cents per share, for 1984. In 1983, the company posted profits before extraordinary items of \$10 million, or 33 cents per share; including net operating loss carryforwards, the company posted total profits of \$13.4 million, or 44 cents per share, in 1983.

For the fourth quarter ended Dec. 31, Intecom reported revenue of \$42.3 million, up 73% from \$24.4 million a year earlier.

Profits for the fourth quarter were \$4.4 million, or 14 cents per share, compared with \$4.5 million, or 14 cents per share, for the fourth quarter of 1983.

C. Michael Bowen, chairman and chief executive officer of Intecom, said the company was "pleased with the increased penetration that Intecom achieved in the market for advanced communications products... and [looking] forward to further improvements in 1985."



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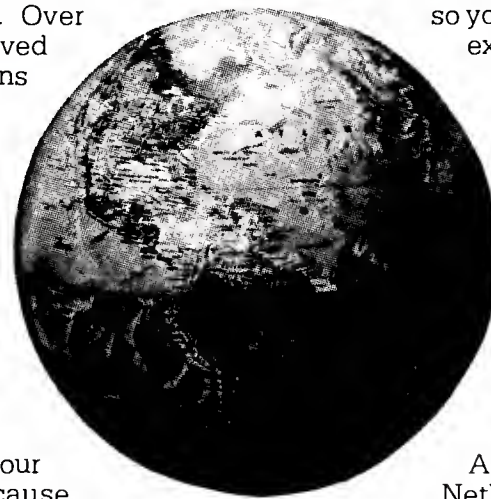
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COMPUTER INDUSTRY

Investor buys MAI's systems division

TUSTIN, Calif. — Bennet S. LeBow, a private investor, recently announced the completion of his purchase of the worldwide operations of Management Assistance, Inc.'s (MAI) Basic Four Information Systems division. LeBow formed MAI Basic Four, Inc. to continue those operations.

Additionally, Bell Atlantic Corp. said it had completed its acquisition of MAI's Sorbus Service division and MAI Canada Ltd. subsidiary. In another aspect of MAI's liquidation, former employees of an MAI subsidiary acquired the rights to sell and service MAI's micro software tools.

LeBow's company will continue to manufacture and market the Basic Four line of computer systems, including the recently introduced Series 2000 and Series 8000 systems. The company, headquartered here, will design, develop, manufacture and market business management systems and related products, the announcement said.

LeBow said that Canadian operations of the former division had been sold and that MAI Canada Ltd. will be the exclusive distributor for Basic Four systems in Canada.

The sale was made to reduce debt and increase the capital of the new company, LeBow said. Bell Atlantic said it paid \$23 million for the Canadian operations.

The former Sorbus Service division was incorporated as Sorbus, Inc. in Frazer, Pa. Sorbus will continue to offer maintenance services for Basic Four systems in the U.S.

Promark, Ltd. of Albuquerque, N.M., acquired the rights to continue sales, maintenance and support of the MAI series of integrated accounting applications and Business Basic/Micro language, originally created and marketed by MAI/Basic Four Business Products Corp.

Promark is owned by former employees of the micro subsidiary and headed by Patrick Riley, who was president of the subsidiary. The company said it will continue support of joint-labeled MAI software products provided under contract to Tandy Corp. The versions marketed for IBM microcomputers and compatibles will continue to bear the MAI trademark under a royalty arrangement with LeBow's company, Promark said.

BREAKS from page 103

Congressional Research Service and Cait, Rep. Robert T. Matsui (D-Calif.) said the reports will "help significantly" the chances of Congress passing the extension bill. Matsui and other supporters of the credit said that it is more than a special-interest tax break because industrial R&D helps the whole U.S. economy.

The Cait study projected that a permanent R&D credit would add between \$2.9 billion and \$17.1 billion annually to the gross national product (in constant dollars) by 1991. In the high end of this range, the study said, the extra revenue would more than offset the tax credit's cost to the Treasury Department.

"While it is difficult to predict the amount exactly, it's easy to see that R&D in our industry increases productivity in other business sectors through the invention of new equipment and processes," said Vico E. Henriques, president of the Computer and Business Equipment Manufacturers Association and secretary of Cait.

The Cait study concluded, "The U.S. relies primarily on private companies to undertake R&D, yet there is strong evidence that, without additional government support, private companies will spend less on R&D than is socially optimal."

The study was prepared by Martin Neil Baily and Robert Z. Lawrence of the Brookings Institution based in Washington, D.C., with assistance from Data Resources, Inc. "It would be extremely foolish to end this tax credit at a time when we are trying to increase the growth of the economy," Baily said at a press conference on the Cait study.

LOTUS from page 103

Lotus' action, announced last month, comes on the heels of a federal court decision in California last month that said Apple Computer, Inc. was not acting in restraint of trade by prohibiting mail-order sales of its products. The plaintiffs in that case, however, were six authorized Apple dealers.

Pointing to the Apple case, attorney Stephen R. Steinberg said Lotus is on firm legal ground in taking action against gray marketers. Steinberg, computer law specialist with the New York law firm Reavis & McGrath, said Lotus has a right to control its distribution.

Attorney Barry D. Weiss of the Chicago law firm Lurie, Sklar & Simon, Ltd. also said that a reasonable "nonprice restriction" on distributors would likely be upheld by the courts and added that Lotus' position is buttressed by the fact that "the courts have ruled that a discounter is taking a free ride on the advertising of the manufacturer."

Ken Carpenter, president of First Software, a Lawrence, Mass., authorized Lotus dealer, said Lotus "is in a unique position to take this needed step to eliminate the gray-market problem."

One admitted unauthorized dealer, Compuclassics of Reseda, Calif., saw things differently. Jimmy Valena, Compuclassics support service manager, said Lotus has requested that his firm voluntarily quit selling Lotus' Symphony. "[Lotus] has no legal right to stop us from selling it," Valena claimed.

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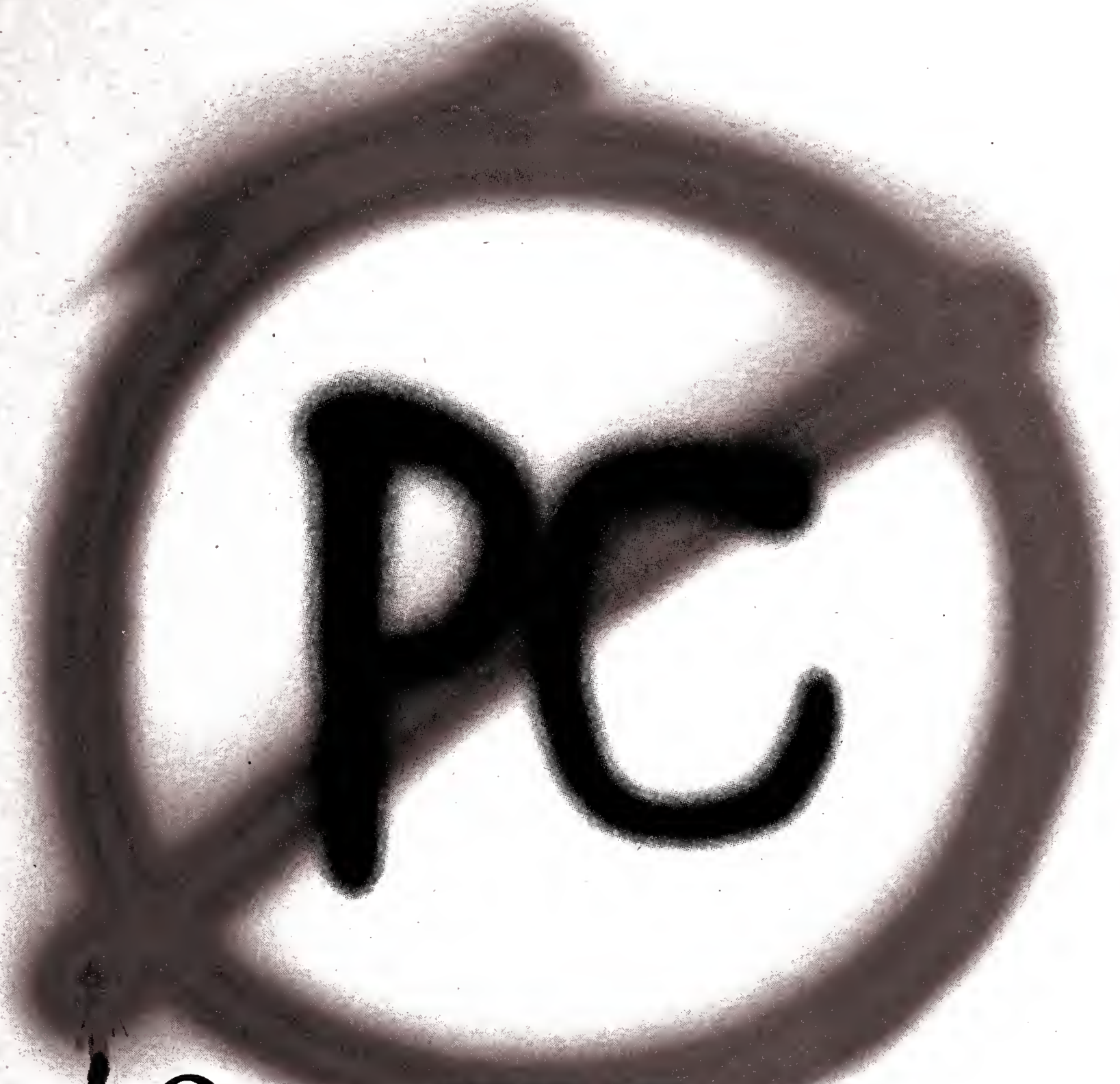
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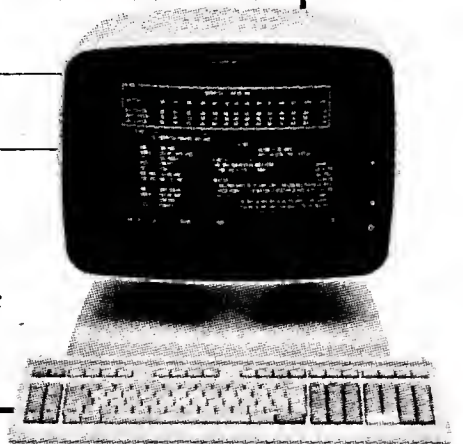
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Integrated Query	yes	promised	promised
Consistent User Interface	yes	promised	promised
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UNIX	yes	no	promised

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Integrated with IBM PC	yes	promised	yes
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COMPUTER INDUSTRY

INDUSTRY from page 103

significantly. That leaves vendors with few options available to squeeze out the increased profit rates that Wall Street incessantly demands.

Perhaps it is just coincidence that the equipment vendors are experiencing problems just six months after the semiconductor industry problems became serious. Perhaps most analysts are correct in believing the problem is short-term and should evaporate in the second half of the year. Certainly the economic indicators give little reason for a negative outlook.

But maybe things are not so rosy. William Zachman, vice-president of the Framingham, Mass.-based International Data Corp. market research firm, offered a gloomy outlook at the end of January, before most of the bad news had surfaced. Zachman, admittedly not a macroeconomist, nonetheless said that "having a strong recession soon may be the best we can hope for."

Zachman theorized that current

HARRIS from page 103

continue to provide service and support for authorized U.S. dealers of Exxon equipment.

Lanier, an Atlanta-based vendor of office automation equipment, was acquired by Harris in a 1983 stock exchange valued at more than \$300 million.

Exxon announced its intention to sell the office systems division last November and had subsequently taken measures to pare down its operations. In January, the company sold its European sales and service operations to Ing. C. Olivetti, spun off its manufacturing facility in Lionville, Pa., as a separate subsidiary [CW, Jan. 21] and halted product development at its Forrestal Center in Princeton, N.J.

Frechette said the transaction with Lanier will leave some 200 employees in administrative positions in Stamford, Conn., and New Jersey, and those employees will be phased out over the next few months. Frechette said it could take two months or more to complete the transfer.

Rectifier settles Siliconix suits

EL SUGUNDO, Calif. — International Rectifier Corp. and Siliconix, Inc. recently announced the settlement of three lawsuits concerning Siliconix's use of alphanumeric part numbers containing the letters "IRF" for certain metal-oxide semiconductor field-effect transistors.

The dispute began when International Rectifier filed suits in England and Germany seeking to prohibit Siliconix's use of part numbers containing the letters. Siliconix, in turn, filed suit in San Jose, Calif., seeking a declaration that its use of the part numbers did not violate International Rectifier's rights and alleging that International Rectifier was trying to monopolize the market for certain semiconductors.

The companies said no payments were included in the settlement, and neither party admitted any liability.

economic indicators may not truly reflect the increased role the information industry plays in the general economy. He also said that large buyers seem to be far more cautious and cost-conscious for 1985 than 1984.

We hope that we are just going through a minor economic glitch and the situation will not further deteriorate.

But there is another factor too much ignored these days. Because of the incredible stability of the economy and the continuing battle to control inflation, the nation's gross national product is projected to have a very low growth this year. If there is very little growth in the national economy, one has to wonder just where the money is going to come from to keep computer vendors booming along at growth rates of from 15% to as much as 50%.

INTEL from page 103

Bader said the operation functions independently of Intel's other divisions and intends to develop the end-user market with "finesse and subtlety," rather than trying to bulldoze its way in.

Half of the operation's staff was hired from outside Intel — primarily personnel with the retail experience Intel never had the need to acquire.

A number of products were under consideration for the operation's first release, Bader said, "but what all the retailers were telling us was that they had all kinds of customers coming in and asking for the 8087." Previously introduced by Intel to speed numerical processing, both the 8087 and 80287 can be snapped into an empty socket on the IBM Personal Computer and Personal Computer XT

for the 8087 and on the Personal Computer AT for the 80287. While the 8087 has been available for some time through IBM, "What we heard was that availability from IBM was spotty and inconsistent," Bader said.

By focusing initially on existing products, the new division has an opportunity to "learn how to do business with the dealers" before bringing out entirely new products, according to Johnson and Bader.

Intel has signed up a total of 400 retail outlets, including several major retail chains and independent retailers, and has set a goal of 1,500 outlets by the end of 1985. Dealers will be served by independent sales representatives and Intel will promote a corporate accounts marketing program to send Intel personnel into Fortune 1,000 firms to assist dealers, Bader said.

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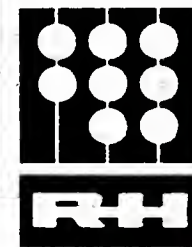
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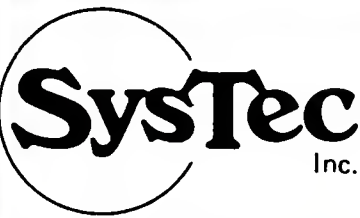
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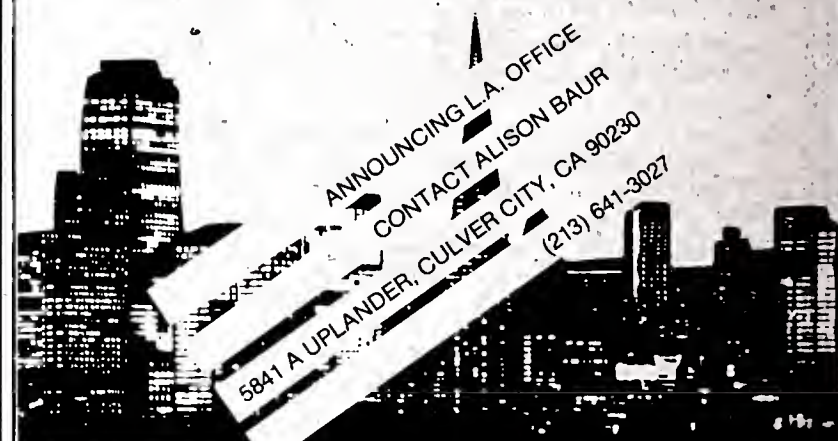
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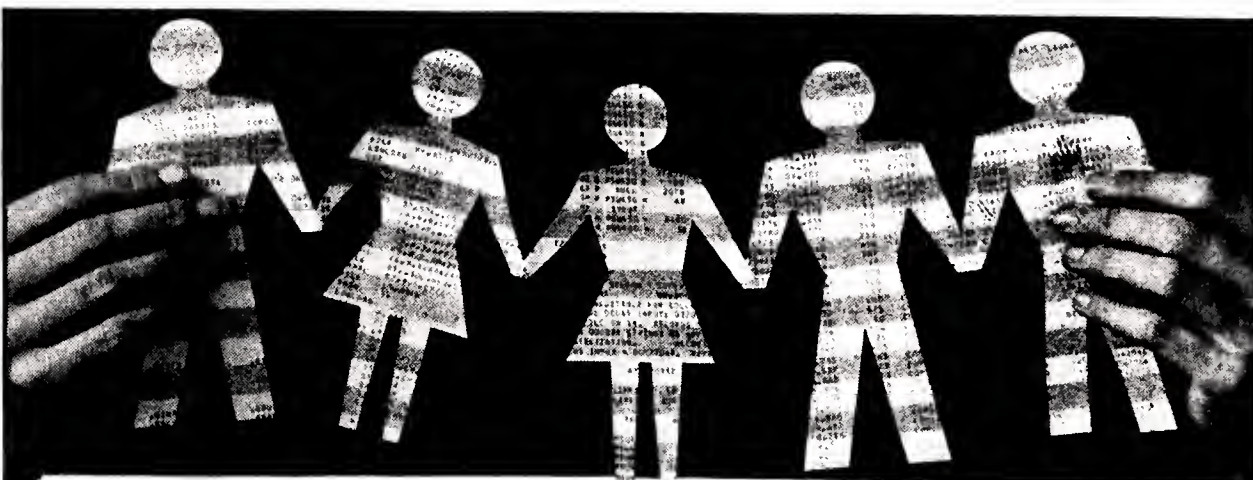


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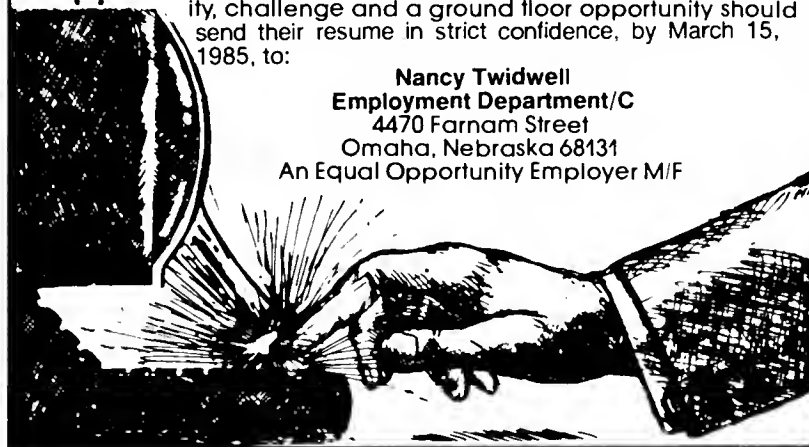
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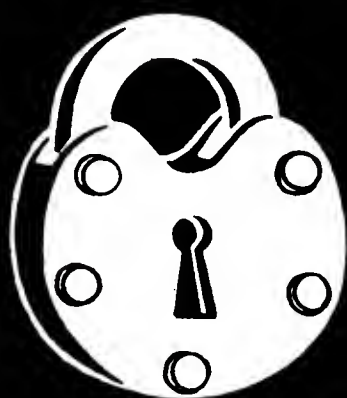
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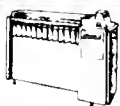


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MARCH 1985

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4321

0.25

1

4331-1

0.25

0.5 to 1

4331-11

0.38

1 to 2

4331-2

0.50

1 to 4

4341-9

0.52

1 to 4

4361-3

0.70

2 to 4

4341-10

0.75

2 to 4

4341-1

0.88

2 to 4

4341-11

1.1

2 to 8

4361-4

1.15

2 to 12

3031

1.2

2 to 8

4361-5

1.45

2 to 12

4341-2

1.5

2 to 16

4341-12

1.65

2 to 16

3031AP

2.0

2 to 8

4381-1

2.1

4 to 16

3032

2.5

2 to 8

4381-2

2.7

4 to 32

3033S

2.9

4 to 16

3083CX

3.3

8 to 32

4381-3

4.0

8 to 32

3083E

4.2

8 to 32

3033N

4.3

4 to 16

3083X

4.4

8 to 32

3033UP

5.0

4 to 24

3083B

6.3

8 to 32

3083BX

6.6

8 to 32

3083J

8.4

8 to 32

3033MP

8.5

8 to 32

3033AP

8.5

4 to 24

3083JX

8.8

8 to 32

3081D

10.0

16 to 32

3081G

11.0

16 to 48

3081GX

11.9

16 to 64

3081K

14.0

16 to 48

3081KX

15.5

16 to 64

3084G

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8 to 32

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8 to 32

5840

8.4

16 to 64

5850

11.6

16 to 64

5860

14.0

16 to 64

5867

22.0

24 to 64

5866

22.0

32 to 128

5870

26.6

16 to 64

5880

26.6

32 to 128

AS/6650

2.4

4 to 16

AS/8023

2.9

4 to 32

AS/8043

5.2

8 to 32

AS/8053

6.5

8 to 32

AS/8063

8.4

16 to 32

AS/9040

7.2

8 to 48

AS/9050

9

8 to 48

AS/9060

11.2

16 to 64

AS/9070

16.2

16 to 64

AS/9080

20

16 to 64

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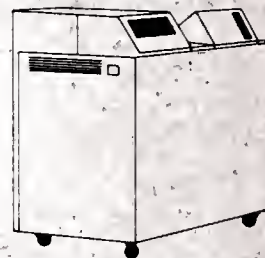
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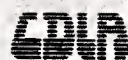
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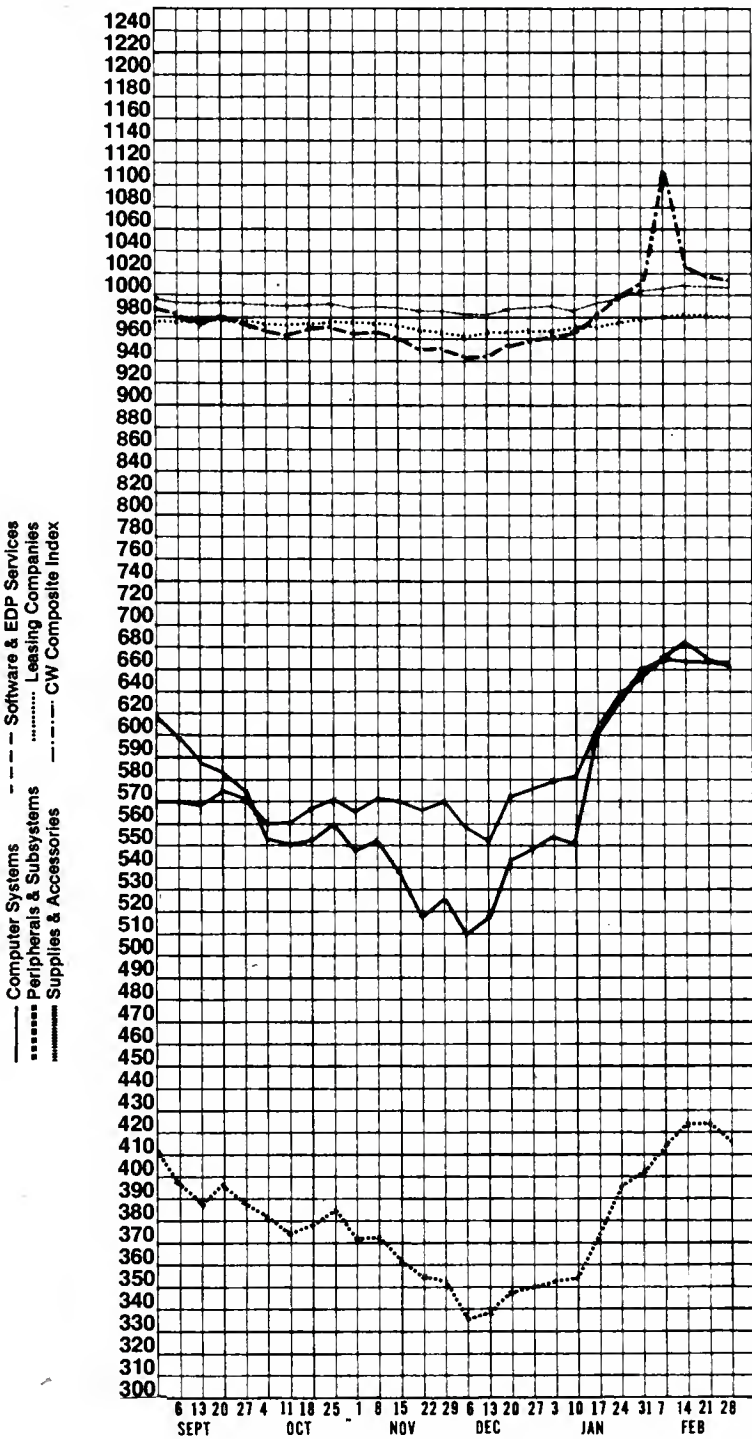
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Computerworld Stock Trading Index



Computerworld Stock Trading Summary

CLOSING PRICES WEDNESDAY, FEBRUARY 27, 1985

All statistics compiled,
computed and formatted
by
TRADE QUOTES, INC.
Cambridge, Mass. 02139

	PRICE				
	1984-85	CLOSE	WEEK	WEEK	
	RANGE	FEB 27	CHNGE	CHNGE	PCT
	(1)	1985			

COMPUTER SYSTEMS

O ALPHA MICROSYSTEMS	8-24	7 1/2	-1/2	-6.2
O ALTOS COMPUTER SYST	7-21	12 1/2	-1/8	-0.9
A ARADAH CORP	10-30	18 1/8	-1/2	-3.0
O ARPIF COMPUTER INC	10-25	25 1/8	-1/2	-4.7
N AT&T	15-22	21 1/8	-3/8	-1.7
N BURROUGHS CORP	44-64	61 3/8	0	0.0
O COMPAQ COMPUTER CP	4-15	9 1/2	-1/8	-1.2
O COMPUTER AUTOMATION	3-17	8	+1/2	+6.8
A COMPUTER CONSULTS	8-26	30 7/8	+1/4	+5.3
N CONTROL DATA CORP	25-62	35	-1/8	-3.1
O CONVERGENT TECHNOL	5-41	10	-1/2	-4.7
N CRAY RESEARCH INC	39-75	72 5/8	+2	+2.8
O DAISY SYSTEMS CORP	14-36	35 3/4	+3/4	+2.1
A DATA GENERAL CORP	27-74	57	-1/4	-2.9
N DATAPoint CORP	14-31	19 5/8	-1/2	-2.4
N DIGITAL EQUIPMENT	64-123	113 1/2	-5/8	-0.3
A EECO INC	12-16	14 1/2	-3/8	-2.3
N ELECTRONIC ASSOC.	3-15	5 1/4	-1/8	-2.3
N FLOATING POINT SYST	13-44	30 7/8	-1/2	-1.6
N FOXBORO	26-47	26 1/8	-1 5/8	-5.8
O GENERAL AUTOMATION	5-16	6	-3/8	-5.8
N GOUIN INC	20-44	25 1/8	+1/2	+2.0
N HARRIS CORP	23-48	30 7/8	+1/4	+5.3
N HEWLETT-PACKARD CO	31-48	36 5/8	-1	-2.6
N HONEYWELL INC	46-69	63 7/8	+1 1/8	+1.7
N IBM	103-137	133 1/8	-5/8	-0.4
O IPL SYSTEMS INC	1-14	2 1/2	0	0.0
N IIT CORP	21-47	29 5/8	-3/8	-9.5
N IFA-COM INC	13-35	20 1/2	-1/8	+0.6
N MANAGEMENT ASSIST	1-5	3 3/8	-1/8	-6.8
N MATSUSHITA ELEC(AOR)	56-88	61 1/4	-1/8	-0.2
N MODULAR COMPUTER SYS	6-16	7 1/2	-1/8	-1.8
N MODAM DATA SCI	9-17	11 1/4	+1/8	+1.1
N MOTOROLA INC	29-49	33 7/8	-1 1/2	-4.2
N NAT'L SEMICONDUCTOR	11-20	11 1/2	-7/8	-7.0
N NRI INC	15-36	17	-5/8	-3.3
N NCR	21-34	29 5/8	-1/4	-0.8
N PERKIN-ELMER	18-37	26 1/2	-1 1/4	-4.5
N PRIME COMPUTER INC	11-26	16 3/4	+3/8	+2.0
N SPERRY CORP	35-54	53 5/8	+5 3/8	+11.1

LEASING COMPANIES

O BOOTH FINEANCIAL CP	10-22	21 3/8	+3/4	+3.6
A CRI CORP	4-10	8 7/8	+1/8	+1.4
N COMDISCO INC	9-42	15 7/8	-1/2	-3.0
O CONTINENTAL INFO SYS	3-16	9	-1/2	-5.2
N OFF INC	10-17	16 1/8	-5/8	-3.7
O FINANCE GROUP INC	4-12	4 1/4	-1/4	-5.3
O PHOENIX AMERICAN INC	3-17	3 7/8	+1/4	+6.8
O SPOTFARM INC	8-21	11	+1/4	+2.3
N U.S. LEASING	29-41	41 3/8	-3/8	-0.8

COMPONENTS

N ADVANCED MICRO DEV	25-41	33	-3/4	-2.2
O ADV'D SEMICONDUCTOR	15-39	19 1/4	-1 1/4	-6.0
N ANALOG DEVICES INC	20-32	27 1/2	-1/2	-1.7
O ANALOGIC CORP	10-31	14 1/8	-3/8	-2.5
A APPLIED MAGNETICS CP	9-37	13 3/8	+1/8	+0.9
O HADCOR CORP	3-12	5	0	0.0
O MICRO MASA INC	8-19	9 1/4	0	0.0
N TERADYNE	22-39	27 5/8	-5/8	-2.2

	PRICE				
	1984-85	CLOSE	WEEK	WEEK	
	RANGE	FEB 27	CHNGE	CHNGE	PCT
	(1)	1985			

SOFTWARE & EDP SERVICES

O ADVANCED COMP TECH	2-8	2 3/4	+1/4	+10.0
N ADVANCED SYSTEMS INC	9-22	11 7/8	0	0.0
O AOS COMPUTERS INC	10-32	15 1/8	-3/8	-2.4
O AMERICAN SOFTWARE	12-31	16 1/4	-1	-5.1
N ANACOMP INC	2-19	3 3/4	-3/8	-9.0
O ANALYSTS INTL CORP	5-17	6 1/4	+1/2	+8.4
A APPLIED DATA RES	18-38	37 1/2	-3/4	-1.9
O ARADON TATE	6-15	9	+1/2	+5.8
A ASKA COMPUTER SYSTEMS	13-24	21 1/2	0	0.0
F AUTRADYNE COMP IND	1-7	1 7/8	+1/8	+7.1
N AUTOMATIC DATA PROC	30-46	45 1/8	-7/8	-1.9
O COMPUTER ASSOC INT'L	15-35	26 3/4	+1 1/2	+5.9
O COMPUTER HORIZONS	8-20	8 1/4	+1/8	+1.5
O COMPUTER NETWORKS	5-11	8 1/2	-1/8	-1.4
N COMPUTER SCIENCES	11-23	15 3/4	-5/8	-2.3
O COMPUTER TASK GROUP	12-20	19 7/8	+3/8	+1.9
C COMPUTER USAGE	1-18	1 3/4	-1/8	-6.6
O COMPUTONE SYSTEMS	4-23	8 7/8	+1/8	+1.4
O CONSERV CORP	1-16	4	-1/4	-5.8
O CONSHARE	6-14	7 3/4	-1/8	-1.5
N CULLINET SOFTWARE	12-33	31 1/8	+1 1/8	+3.7
O CYCARE SYSTEMS INC	16-25	24 1/4	+1 1/4	+5.4
O EARGAN SYSTEM INC	6-27	6 1/4	-1/2	-7.4
N GENERAL ELECTRIC CO	45-55	63 7/8	+3/8	+0.5
N GTE CORP	36-48	42 3/4	+1/4	+0.5
N INFORMATICS GENERAL	14-32	17 3/4	-1/8	-0.6
O INFORMATION SCIENCE	4-17	4 1/4	0	0.0
O INFORMATION SYSTEMS CP	15-43	21	-1 1/4	-5.6
O KEANE ASSOCIATES	6-15	12 1/2	-3/4	-5.6
A LOGICON	18-34	32 3/8	-1 5/8	-4.7
O LOTUS DEVELOPMENT CP	15-40	31 1/2	+1 1/2	+5.0
O MCI COMMUNICATIONS	6-28	9 1/2	-7/8	-8.4
O MGT SCI AMER INC	9-33	12 5/8	0	0.0
O MATHEMATICAL APP GRP	6-16	6	0	0.0
O MICOM SYSTEMS INC	27-50	33 1/4	-2	-5.6
O MICROPRO INT'L CP	2-10	2 3/4	-1/8	-4.3
O NATIONAL DATA CORP	8-26	10 1/2	-3/8	-3.4
O ON-LINE SOFTWARE INT	4-28	6 1/4	-1/2	-7.4
O PANDUIT SYSTEMS	11-30	19 1/4	-1 5/8	-7.8
N PLANNING RESEARCH	10-21	15 3/4	+1/2	+3.7
O POLICY MGMT SYST CP	22-35	23	-1 1/2	-4.3
O PROGRAMING & SYS	4-8	4 3/4	-1/8	-2.5
O REYNOLDS & REYNOLD	28-55	41 1/2	-1	-2.3
O SEI CORP	11-34	17 3/8	-1/4	-1.4
O SHARED MEDICAL SYST	23-43	33 1/4	+1/4	+0.7
O SCIENTIFIC COMPUTERS	5-14	6 3/4	+1/2	+6.8
O SOFTWARE AG	9-21	19 5/8	-1/4	-1.2
O SURE CORP	10-18	13 3/4	+1/4	+1.8
N UCCEL	7-17	14 5/8	-1/4	-1.6

PERIPHERALS & SUBSYSTEMS

P AM INTERNATIONAL	2-7	5 3/8	-1/4	-4.4
A ANDERSON JACOBSON	3-26	4 1/2	+1/4	+5.8
O ART RESEARCH INC	7-20	20	-3/8	-1.8
O AUTO-TROL TECHNOLOGY	8-29	11 3/4	-1	-7.8
O AVANT-RANGE COMPUTING	17-29	15 1/4	-5	-27.3
O BANCET INC	5-22	10 1/4	+1/2	+5.1
A BEEHIVE INT'L	1-7	1 1/8	+1/4	+28.5
N BOLT-BERANEK & NEW	17-30	29 1/2	+1/8	+0.4
O CANEX CORP	3	2 1/4	0	0.0
N CENTRONICS DATA COMP	8-28	8 5/8	-7/8	-9.2
A CFTCO CORP	7-12	7 5/8	-1/8	-1.6
A COGNATRONICS	4-20	5 7/8	0	0.0

	PRICE				
	1984-85	CLOSE	WEEK	WEEK	
	RANGE	FEB 27	CHNGE	CHNGE	PCT
	(1)	1985			

N COMPUGRAPHIC CORP	26-40	33 5/8	+1/8	+0.3
O COMPUTER TRANSDUCER	3-10	1	0	0.0
N COMPUVISION CORP	29-53	36 3/4	-2 5/8	-6.6
N CONRAC CORP	11-24	13	+1/8	+0.9
A DATAPRODUCTS CORP	14-32	17 1/2	-1/4	-1.4
A DATARAM CORP	4-12	6 1/4	-1/8	-1.8
O DATA SWITCH CORP	5-47	7 3/4	0	0.0
O DATUM INC	5-17	7 7/8	+5/8	+8.6
O DECISION DATA COMP	9-18	18 1/4	+1/8	+0.6
O DECUTEL-OLIVETTI	4-39	3 7/8	+1/4	+6.8
N ELECTRONIC M & M	5-11	6	0	0.0
O ENDATA, INC	6-16	5 3/4	0	0.0
O EVANS & SUTHERLAND	11-50	14 3/8	-3/8	-2.5
O GANDOLF TECHNOLOGIES	R-14	8 3/8	-5/8	-6.9
N GEN'L DATA CORP IND	10-20	17 1/4	-7/8	-4.8
N HAZELTINE CORP	16-33	26 1/2	-1 1/4	-4.5
O IOTY CORP	3-8	5 3/4	0	0.0
O INFORMATION INTL INC	10-19	12 1/2	-1/4	-1.9
O INTECOM INC	7-21	8 5/8	-1/8	-1.4
O INTEL CORP	27-45	27 1/2	-1 1/4	-4.3
A JUNDY ELECTRONICS	7-19	11 7/8	0	0.0
O NEGADATA CORP	3-8	7 3/8	0	0.0
A NSI DATA CORP	9-25	11 1/8	-1/2	-4.3
N NASHUA CORP	19-29	28 5/8	-3/8	-1.2
O NETWORK SYSTEMS CORP	16-34	28 1/8	+7/8	+3.0
N NO AMERICAN PHILIPS	30-45	43 1/4	-2	-4.4
N NORTHERN TELECOM LTD	30-49	37 5/8	-3/4	-1.9
O OMF	1-6	1 1/8	0	0.0
N PARADYNE CORP	11-26	15 7/8	-1 1/2	-8.6
A PENRIL CORP	8-14	13 5/8	+1/8	+0.9
N PERSPEX CO (ADR)	20-41	21 1/4	+1/4	+1.1
O PRINTRONIX INC	13-34	16 5/8	-5/8	-3.6
O RAMTEK CORP	4-23	5 5/8	-1 1/8	-17.3
N RECOGNITION EQUIP	10-17	15 3/8	-1/4	-1.5
N SANDERS ASSOCIATES	32-120	42 1/4	+7/8	+2.1
O SCAN-TRON CORP	9-19	13 3/4	+3/8	+2.8
N SCIENTIFIC ATLANTA	R-23	13 1/8	+1/8	+0.9
O SEADATE TECHNOLOGY	4-20	8	-1/8	-1.5
N STORAGE TECHNOLOGY	2-23	3	-1/4	-7.6
O SYKES DATATRONICS	1-13	1 1/4	-1/16	-4.5
A TAB INC	7-17	6 3/8	-5/8	-6.9
A TAB PRODUCTS CO	13-20	18	+7/8	+5.1
O TANDON CORP	6-35	6 7/8	+1/4	+3.7
A TFC INC	6-12	11 3/8	+3/8	+3.4
N TETRAONIX INC	52-67	65	0	0.0
N TELEX	18-46	45 1/8	+1/4	+0.5
O TESDATA SYSTEMS CP	2-17	2	0	0.0
N TIMEPLEX INC	13-23	19 1/4	-2 3/4	-12.5
O VISUAL TECHNOLOGY	2-26	1 3/4	0	0.0

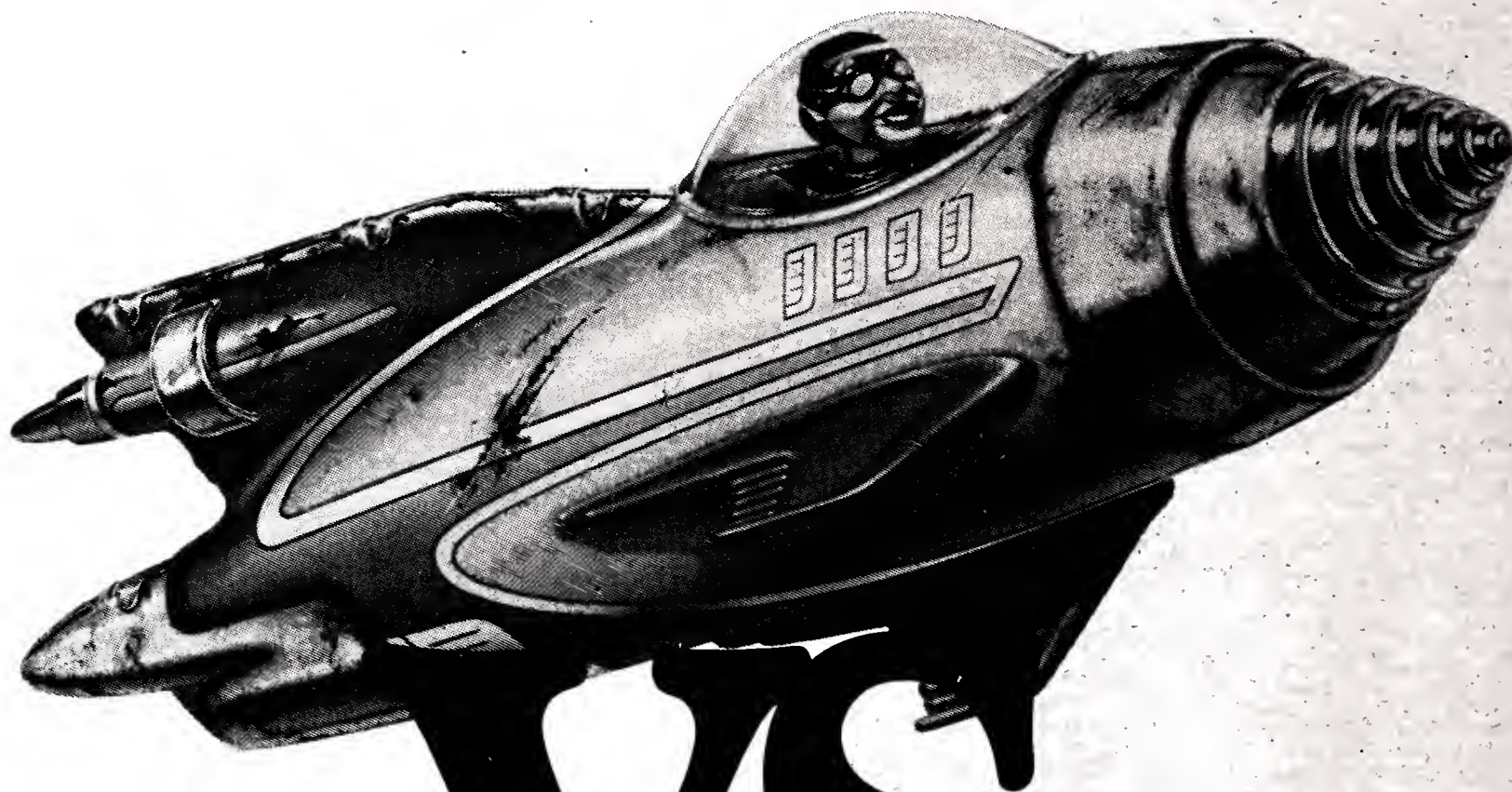
SUPPLIES & ACCESSORIES

N AMERICAN BUS PRODS	17-24	24 1/4	+1/8	+4.8
N BARRY WRIGHT	21-33	26 1/4	-3/4	-2.7
A DUPLEX PRODUCTS INC	22-29	28 7/8	0	0.0
N ENNIS BUS. FORMS	18-37	34 7/8	-1 1/8	-3.1
N FM COMPANY	68-90	82 3/8	-1/2	-0.6
N MOORE CORP LTD	35-52	51 1/4	-1/4	-0.4
O STANDARD REGISTER	27-56	55 3/4	+1	+1.8
N WALLACE CORP SERVICE	23-38	35 5/8	-1/4	-0.6

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